Yahoo Group Archive: NOFARSHamAcademy

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Messages included in this PDF: 59

Yahoo replaced the domain portions of email addresses with @... in the archived messages. Characters lost in Yahoo's archived text appear as ?.

Messages are presented in ascending Yahoo message-ID order. Gaps indicate records absent from the source WARC or messages omitted from this PDF as spam.

1. Introduction

Yahoo group: NOFARSHamAcademy
Date: 2001-08-28 16:59:04 UTC
From: Billy Williams
Topic: 1 Message: 1

Students are encouraged to get a copy of the Technician Class Question Pool. This pool is referenced as Element 2 and contains 384 questions. The current pool is valid until June 30, 2003.

The basic Element 2 pool can be downloaded via www.fcc.gov but only the questions and multiple choice answers are included. There are no explanations.

An inexpensive text is the Radio Shack "Technician Class" book. It contains all the items along with a basic explanation. It can be purchased at most Radio Shack stores for around $10.

ARRL produces books and manuals such as "Now You're Talking" with more in depth explanations. These can be found via www.arrl.org

Much of the material involves memorization of abbreviations, symbols and radio dial readings. There is no easy way to explain these. Put such items on small note cards and carry these around with you. Try to work on these items for 15 or 30 minutes each day.

Make plans to attend the North Florida Amateur Radio Society meeting on Thursday, Sept. 13th at Ed White High School. Some of the items discussed will help you to better understand the role of Amateur Radio. The meeting starts at 7:30PM in the cafeteria area. NOFARS is the biggest Amateur Radio club in Norheast Florida with over 300 members and continues to grow. Membership is available to all for only $5 per calendar year.

Also remember the Jacksonville Poor Man's Hamfest at Florida Community Coillege North Campus on Saturday, October 6th. The site is easily accessible via I-295 and the Dunn Avenue exit in NW Jax. This event is FREE and hours are 6:30AM until 2PM. Most hamfest sponsors charge a hefty admission fee to balance their club budgets but such is not the case with our Poor Man's Hamfest. It is staged as a service to the Greater Jacksonville Amateur Radio community. The hamfest will feature demos, forums and a huge outdoor tailgate area where Amateur Radio related items can be traded, bought or sold.

Formal instruction will begin after the September 13th NOFARS meeting. In the interim, get started on memorizing items in the question pool.

2. Element 2 Subelement T1 Group A (T1A)

Yahoo group: NOFARSHamAcademy
Date: 2001-09-18 20:21:26 UTC
From: Billy Williams
Topic: 2 Message: 2

To earn the entry-level Technician Amateur Radio license requires that an applicant pass Element 2. This element contains 384 questions (items) that are broken down into ten sub-elements. Each subelement is broken down into several question "groups."

The breakdown is shown in detail on Table 1-4 on page 9 of the Technician Class Study Guide produced by Radio Shack. This is publication #62-2440. Other study guides also have this breakdown.

Out of the 384 items, you will get 35 questions on your test. 75% is considered passing. Many of the items are repetitive with the same quesrtion asked several different ways.

Our study begins with subelement T1 which contains 102 items covering FCC rules. You will get nine of these items on your exam.

Get your study guide and begin going over the items in subelement T1, group T1A. There are 12 questions in group T1A. These require some memorization. Key points to keep in mind are:

(1) Only the Federal Communications Commission (FCC) regulates Amateur Radio although FAA permission may be required for antennas near airports or over 200 feet in height.

(2)There are five purposes of Amateur Radio relating to international good will, public service, scientific experimentation, etc. Study these.

(3) Each ham station must have a control operator in charge when it is on the air transmitting. Some may operate automatically but even these must be supervised by a control operator. Usually, the control operator is the equipment owner holding the ham license. When you get your license you will be a control operator of your station. Club stations may be operated by members appointed by the club trustee. These members are then considered to be the control operators (such as at the annual Field Day exercise)

(4) Operators must be licensed. After you pass the exam, you will get a license from FCC in the mail. However, you can operate before getting the actual license if you have passed the exam and your new call appears in the FCC data base on Internet.

(5) There are now three grades of license: Technician, General and Amateur Extra. Novice and Advanced class licenses are no longer issued.

(6) Licenses normally are valid for ten years and can be renewed without re-examination by filing form 605 either on paper or via Internet.

Licenses can be renwed only during the last 90 days before expiration. Applications filed earlier are ignored by FCC.

(7) If you do not renew your license before expiration, you have a 2 year grace period. However, you cannot operate until the renewal is granted.

(8) If you change address, you must notify FCC using form 605 and modify your license to show the new address. Such paperwork is sent to FCC in Gettysburg, Pa.

The next group is T1B. This includes many dial readings (frequency bands) that must be memorized. We will start discussion of T1B in our next dispatch in a few days.

Questions may be submitted by sending these via e-mail to NOFARSHam Academy@... There may be a delay before these questions are posted since this is a moderated group. The moderator may combine several questions to keep down the volume of e-mail on this list.

Also, questions can be sent to n4uf@...

3. Subelement T1B: Technician Frequency Privileges

Yahoo group: NOFARSHamAcademy
Date: 2001-09-19 21:05:10 UTC
From: Billy Williams
Topic: 3 Message: 3

Subelement T1 Question Group B contains 12 items. These relate to frequencies (dial readings) that you can use to communicate as a Technician licensee. Mastering these is mainly an exercise in memorization.

Learn these frequency ranges in megahertz (MHz) and their wavelength designation in meters. Consult the ARRL Operating Manual and other publications for an indepth discussion of frequency and wavelength. Just think of these for now as radio dial readings. Put these on a note card and carry the card around with you. When you get a few spare moments, pull out the card and drill on associating the band and the wavelength.

Very High Frequency (VHF) & Ultra High Frequency (UHF) Bands

50.0 to 50.4 MHz 6 Meters
144-148 MHz 2 Meters
222-225 MHz 1 1/4 Meters
420-450 MHz 70 centimeters
(cm)
902-928 MHz 33 cm
1240-1300 MHz 23 cm
2300 to 2310 and 2390 to 2450 MHz 13cm

Also learn these "high frequency" band dial readings. These reading are in Kilohertz (KHz). These privileges are available to Technician licensees who pass a 5 word per minute Morse code Exam (Element 1). Operators may not use voice on these segments..

3675-3725 KHz 80 Meters
7100-7150 KHz 40 Meters
21,100 to 21,200 KHz (21.1 to 21.2 MHz) 15 Meters

And Technians who pass passed Element 1 can use both voice and code on 10 meters.

28,100 to 28,500 KHz (28.1 to 28.5 MHz) 10 Meters

To gain these extra "long-distance band" privileges, you attend an exam session and take the element 1 code test. If you pass, you will receive a Certificate of Successful Completion (CSCE). The CSCE is your permanent proof that you have passed Element 1.

Review the e-mails on T1A and T1B and drill on the items. Many find that several short study sessions of 20 to 30 minutes each day work better than one long two hour session. See what works best for you.

An extra task that will make your future learning easier is to learn the metric prefixes and their equivalents. These are used in all areas of science. Learn these eight prefixes and their meaning:

SMALL PREFIXES (Less than 1)

ABBREV. PREFIX MEANING

m Milli A thousandth of something(.001)

u Micro A millionth of something(.000001)

n Nano A billionth of something(.000000001)

p Pico A trillionth of something(.000000000001)

LARGE PREFIXES (Larger than 1)

K Kilo A thousand of something 1,000

M Mega A million of something 1,000,000

G Giga A billion of something 1,000,000,000

T Tera A trillion of something 1,000,000,000,000

4. Subelement T1 Question Group C

Yahoo group: NOFARSHamAcademy
Date: 2001-09-20 22:23:02 UTC
From: Billy Williams
Topic: 4 Message: 4

This group contains 11 items and covers more dial reading ranges where Technician operators can communicate. Again, repetition and memorization is in order.

The different methods of communication are called modes. The most popular mode is voice (radiotelephone or "phone"). There are two main types of phone. As in the case of commercial radio stations, Amateur Radio operators can use AM or FM.

A more advanced type of AM voice is Single Side Band(SSB).

Generally FM is used mostly above 50 MHz (6 meters) although some FM operation can be found on 10 meters.

Most voice or phone operation below 30 MHz is AM or SSB although these modes are legal on higher frequencies. Technicians are not allowed to use FM on the High Frequency Bands such as 80,40,30,20,17, 15,12 and 10 meters but can use FM on the VHF and UHF bands such as 6, 2, 1.25 meters, 70 cm, etc.

Most bands are divided into sub-bands with most modes being restricted only to certain band segments. It is not legal to use certain modes unless your dial reading is within the correct sub-band.

On 6 meters, voice may be used from 50.1 to 54 MHz. Voice cannot be used from 50.0 to 50.1 MHz.

On 2 meters, a similar arrangement exists. No phone or voice is permitted from 144.0 to 144.1 MHz. But phone is permitted from 144.1 to 148.0 MHz.

Another mode is IMAGE which is narrow bandwidth (low detail) television. It also is called Slow Scan TV (SSTV). Image is also allowed within 144.1 to 148.0 MHz. just as voice is on 2 meters.

The Morse Code mode can be used on most any amateur frequency. On 2 and 6 meters, the bottom .1 MHz is reserved solely for Morse Code (also known as CW).
So, on 6 meters 50.0 to 50.1 MHz is reserved exclusively for Morse Code while on 2 meters, the exclusive CW assignment is 144.0 to 144.1 MHz.

Technicians have several band assignments where they can operate in the Morse Code mode in order to gain speed and proficiency. On 40 and 80 meters, the only mode the Technician can use is CW.

On 10 meters, the Technician can use CW, Radioteletype (RTTY), and Data (computer communications) modes from 28.1 to 28.3 MHz. From 28.3 to 28.5 MHz., a Technician can use CW and SSB.

There are several bands where the Technician can use all legal modes with no limitations. These are 1.25 meters and 23cm.

On 70 cm, Image mode may be used from 420 to 450 MHz.

These assignments may seem fragmented and confusing. Again, repetition is the key.

To summarize the bands available:

High Frequency Bands--Communications on these bands covers long distances due to ionospheric "skip" and other factors.

160 Meters 1800-2000 KHz Not available to Technicians

80 Meters 3500-4000 KHz Technicians limited to CW on 3675-3725 KHz

40 Meters 7000-7300 KHz Technicians limited to CW on 7100-7150 KHz

30 Meters 10,100-10,180KHz Not available to Technicians

20 Meters 14,000-14,350 KHz Not available to Technicians

15 Meters 21,000-21,450 KHz Technicians limited to CW on 21,100-21,200 KHz

10 Meters 28,000 to 29,700 KHz (28.0 to 29.7 MHz)

**Technicians limited to code on 28.1 to 28.5 MHz, Data and code on 28.1 to 28.3 MHz and phone on 28.3 to 28.5 MHz.

VHF & UHF BANDS--These are mainly useful for local communications ranges of 30 to 50 miles although some occurances can cause much longer distance coverage.

6 Meters 50.0 to 50.4 MHz

2 Meters 144.0 to 148.0 MHz

1 1/4 Meters 222 to 225 MHz

70 Centimeters 420 to 450 MHz

35 Centimeters 902 to 928 MHz

23 Centimeters 1240-1300 MHz

5. Subelement T1 Question Group D

Yahoo group: NOFARSHamAcademy
Date: 2001-09-24 16:42:42 UTC
From: Billy Williams
Topic: 5 Message: 5

These 12 items deal with control of an Amateur Radio station. As a general rule, a control operator must be in charge of a station that is transmitting. Usually, the control operator is the equipment owner. Club stations, such as W4IZ (The NOFARS station) have a Trustee who is responsible for appointing control operators and overseeing station operation.

Remember these points as you study the questions in T1D:

(1)Every station is required to have a "control point" from where the equipment can be turned on or off and adjusted. This would normally be at your operating position in your house. Some stations are allowed to have remote control points.

(2) The control point location is where the control operator performs his or her duties. At a minimum, the equipment must be able to quickly turned off if a malfunction occurs.

(3) If you visit another hams station and use his or her equipment, both the host ham and the guest operator are jointly responsible for proper operation.

(4) Control operators must have a ham license with privileges for the frequency band being used.

(5)A station licenseholder is responsible for seeing that his or her station is operated in accordance with FCC rules. If not, the control operator must cause the station to stop transmitting quickly.

(6) If you operate as a guest operator at another hams station and that ham has higher privileges, you can only operate to the extent that your license permits.

(7)When a station is transmitting, the control operator must be present at the control point. Some allowances are made for stations authorized to be controlled auomatically such as repeater systems.

(8)Station ID must be given every ten minutes and at the end of the last transmission.

(9) No ID is required at the start of a transmission or exchange of transmissions. Some repeater trustees require such an ID at the start of a transmission but such is no longer an FCC requirement.

(10) ID may be given in Morse Code (CW) even though the contact is made using another mode such as voice or data. CW is always acceptable as a form of ID.

(11) If you pass the 5 word per minute Morse Code exam to add low band privileges to your license, no additional ID on ten meters is needed. Just give your regular callsign every ten minutes and at the end of the communication.

Review previous lessons and continue to work on memorization of key points. If you are just joining the NOFARS Ham Academy, you can view previous messages by checking the archives section.

6. Subelement T1 Group E

Yahoo group: NOFARSHamAcademy
Date: 2001-09-25 16:41:25 UTC
From: Billy Williams
Topic: 6 Message: 6

This group of questions deals with "third party" operation. A third party is someone other than the two station operators in communication with each other during a radio contact. In most cases, the third party is unlicensed. For example, you might receive a message for a neighbor and call that neighbor on the telephone and read the message. That message is an example of "third party traffic."

Or you might allow someone without a license to speak on your station. Such is legal as long as you are monitoring the station at all times to assure compliance with FCC rules.

There are some strict limitations on third party traffic and communications. The content cannot be commercial nor can messages be sent by a ham for hire. While third party messages destined for the U.S. and possessions are legal, many foreign countries forbid any third party traffic. Some governments feel that third party traffic via ham radio deprives their state owned utilities of income.

Remember these points as you study T1E:

(1) No payment of any kind is allowed

(2) Third party communications include messages sent between two ham stations for the benefit of someone else.

(3) Third party traffic can only be sent to countries that have signed a "third party" agreement with the U.S. Most of these countries are in the Caribbean as well as Central and South America. Few are in Europe.

(4) When sending international third party traffic, the U.S. station must transmit both callsigns at the end of each communication.

(5) The following forms of communications are not allowed on Amateur Radio.
(A) Broadcasting to the general public.
(B) Music (A minor exception applies to space shuttle transmissions)
(C) Secret codes
(D) Obscene or indecent language (this one can be very subjective)

(6) Generally "one-way" transmissions are not allowed. Such is a transmission where no reply can be sent. However, these "one-way" transmissions specifically exempted and are allowed:
(A)Brief test transmissions
(B) Remote controlled aircraft transmissions for small model airplanes.

(C) Bulletins of interest to the Amateur Radio community such as official bulletins on nets.
(D) Morse code practice

7. Subelement T1 Group F

Yahoo group: NOFARSHamAcademy
Date: 2001-09-26 18:40:45 UTC
From: Billy Williams
Topic: 7 Message: 7

The FCC regulates which frequencies (dial readings) that Amateur Radio operators can use along with the amount of power that can be radiated. Also the mode or type of transmission (Morse Code, voice, image,etc) that can be used is heavily regulated.

The purpose of such regulation is to minimize interference to other services such as public safety (police, fire, etc.), commercial systems, broadcasters, aircraft radios, etc.

The frequency spectrum belongs to the public and the FCC is charged with getting the maximum use out of it. The number of channels in the frequency spectrum is very large but is not infinite. There are many more potential users of the spectrum than there are channels available although recent technological advances in "multiplexing" have allowed one channel to serve many users at the same time.

The more narrow that each channel is--the more channels that can be created within a band. Thus a main goal is for operators to take up as little spectrum space as possible in order to accommodate more users. Recent advances in technology have reduced the bandwidth or the amount of space that each communication occupies. This has led to greater "spectrum efficiency."

Hams are assigned portions of the frequency spectrum in which to operate. Some of these segments are assigned to hams on a primary basis. This means that hams are the principal users and are protected from interference by other secondary users.

Other band segments are assigned to us on a secondary basis which means that we can use these dial readings only if we don't interfere with other primary users. The primary user might be a navigation system or a utility.

Within these Amateur Radio band assignments, all hams with the proper license have an equal right to use a channel. If a communication is already in progress, you cannot just start calling your station on that channel. To do so is to cause malicious interference.

A special philosophy exists for repeater stations that automatically retransmit weak signals from a high location using high power. If a repeater is coordinated with a coordination group, that coordinated repeater has priority over an uncoordinated repeater. The repeater allows those with low powered transmitters to boost their range.

If two coordinated repeater system cause problems with each other, each repeater owner/trustee is responsible for working toward solving the problem.

Power output in watts also is critical. A transmitter running higher power has a stronger signal much as a 100 watt light bulb produces more light than a 50 watt bulb.

A key way of measuring power is the "peak envelope power" (pep) system that is figured on a math formula based on the average power over the whole cycle. To delve much deeper, one must have an understanding of the oscilloscope (a piece of test equipment). Such is beyond the scope of this study.

Unless otherwise stated, the maximum power limit for hams is 1500 watts PEP.

The Technician high frequency, long distance bandson 80, 40, 15 and 10 meters have a power limitation of 200 watts PEP.

You should use only the minimum power that you need to maintain communications. This interpretation is subjective but minimum power is the rule although it would be difficult to enforce.

Computer to computer communications along with telemetry (long distance control signals) are classified as DATA transmissions

Some hams use radioteletype (similar to old radio and TV station newswires) to automatically print messages at the other end. This is called RTTY. Computers also can be programmed to handle such communications.

Computer communications are subject to "speed limits" in order to minimize channel space (bandwidth). On two meters, the speed limit is 19.6 kilobaud or 19,600 bits per second.

The speed limit for RTTY on 6 and 2 meters also is 19.6 kilobaud.

Other speed limits apply to other bands but apparently are not required knowledge for the exam. These are contained in a table in most license manuals.

8. Subelement T1 Group G

Yahoo group: NOFARSHamAcademy
Date: 2001-09-26 18:41:17 UTC
From: Billy Williams
Topic: 8 Message: 8

This group covers several unconnected topics but is relatively brief and straightforward.

Some astronauts are Amateur Radio operators. They are allowed to operate a ham station aboard the shuttle during non-duty hours. Hams also have operated from the International Space Station (ISS). Any ham station up over 50 km above the earth's surface is classified as an Amateur Space Station. Such stations operate under special rules.

Any class of ham operator may operate from space. Amateur Space Stations may use only bands above 144 MHz (2 meters). No operation is permitted on 50 MHz (6 meters).

A ham who uses someone else's callsign without permission (a bootlegger) is operating illegally. Such transmissions are termed "false or deceptive" signals.

Transmitting phony distress signals (Mayday calls) also is considered false and deceptive.

Also, unidentified transmissions are prohibited unless connected to space operation or model aircraft control (that use very low power) via ham radio where special rules apply.

Deliberate (malicious) interference to other stations also is prohibited.

Interference that disrupts other communications whether malicious or not is called "harmful interference."

9. Subelement T1 Group H

Yahoo group: NOFARSHamAcademy
Date: 2001-09-26 18:41:54 UTC
From: Billy Williams
Topic: 9 Message: 9

These 9 items relate to various operating procedure topics.

U.S. hams are allowed to speak foreign languages as long as the required identifications (every 10 minutes and at the end) are given in English. If third party messages are in a foreign language, the control operator must be able to understand that language.

Many letters sound alike via radio. B and D are easily confused for example. When transmitting callsigns or spelling unusual words, it is recommended that operators use the standard phonetic alphabet.

These words are recommended by the International Telecommunications Union (ITU). The words can be used as substitutes for letters when spelling out a word or callsign. For example, the word CAT could be said as "Charlie, Alfa, Tango" using the ITU phonetics. Some operators use cute or non-standard phonetics. Such is not illegal as long as legal IDs are given or unless the intent is to encode or obscure the meaning of a transmission. But to minimize confusion, the ITU phonetics are highly recomended.

A=Alfa J=Juliet S=Sierra
B=Bravo K=Kilo T=Tango
C=Charlie L=Lima U=Uniform
D=Delta M=Mike V=Victor
E=Echo N=November W=Whiskey
F=Foxtrot O=Oscar X=XRay
G=Golf P=Papa Y=Yankee
H=Hotel Q=Quebec Z=Zulu
I=India R=Romeo

Some stations send out automated test transmissions using low power so that propagation (radio wave travel) conditions can be determine. Propagation changes often like the weather. These are called "beacon" stations and are subject to special rules. The maximum beacon power is 100 watts although most use considerably less.

A Technician class license or higher is required to operate a beacon station. Also, a Technician class license or higher is needed to operate a repeater station.

Some model aircraft enthusiasts use ham radio to control their model airplanes. Such transmitters are limited to only ONE watt but are not subject to the station identification rules as long as a tag containing the licensee's name, address and callsign is attached to the transmitter. The 6 meter band is used for model aircraft control.

10. Subelement T1 Group I

Yahoo group: NOFARSHamAcademy
Date: 2001-09-26 18:42:08 UTC
From: Billy Williams
Topic: 10 Message: 10

This is the last group of questions in Subelement T1. It covers distress calls and prohibited practices.

During distress transmissions where there is a serious threat to life, the power limitations, band assignments, etc. can be ignored. If your car breaks down on a blind curve on a high speed expressway, for example, you can use any means available to summon help. But such can be done only when there is an immediate threat to life or a possibility of serious injury or very extensive property damage.

Do not use the code word MAYDAY unless you are in distress.

When members of the Amateur Radio Emergency Service (ARES) activate in an area after a disaster, the FCC may set aside certain frequencies that can only be used by those involved with the response. Other stations must not operate on these frequencies. Such orders are issued in FCC declarations and are disseminated by ARRL Official Bulletin Stations.

Hams may not broadcast. Transmissions must be directed to specific persons and these persons must be able to respond. You cannot send out signals aimed toward unlicensed persons or the general public. These also are a form of "one way" transmission.

An exception is allowed for general bulletins and items of interest related to ham radio. Announcements of club meetings and hamfests are legal if certain requirements are met. Such bulletins are deemed by FCC to be intended for other hams. Reception by the general public is considered only incidental.

Obscene or indecent words also are prohibited although FCC takes a loose interpretation of this subjective topic.

There is no specified list of obscene words. Indeed FCC has indicated that a certain word may or may not be obscene depending on the context in which is it used.

12. Fwd: Subelement T2 Group A

Yahoo group: NOFARSHamAcademy
Date: 2001-10-01 18:00:55 UTC
From: Billy F. Williams
Topic: 12 Message: 12

Subelement T2 covers operating procedures. Some procedures have the force of law while others are recommendations.

Amateur Radio operators must listen to see if a frequency or channel is being used by others before starting a contact or call. Therefore, you should always listen before transmitting when starting a call or contact. If there is any doubt, ask "is the frequency in use?"

However, emergency and distress calls always take the highest priority. Most contacts are what is classified as "routine" communications. By law, operators involved in routine communications must yield the frequency and stop transmitting when another operator has a distress message. The code word for a distress message is MAYDAY.

A distress message is defined as one that involves avoiding possible loss of life, serious injury or extensive property damage.

Examples would be a ship in danger of sinking or even a car broke down on a dangerous highway on a blind curve.

Other operators must not only stop transmitting their routine communications, but also must assist the station in distress.

Some frequency bands that we use are capable of only short range communications (up to 50 miles or so). These are VHF (Very High Frequency) and UHF (Ultra High Frequency)bands including 6 meters, 2 meters, 1.25 meters, 70 cm, etc.

Use VHF and UHF whenever possible for short distance contacts.

The High Frequency bands (HF) such as 10, 12, 15, 17, 20, 30, 40, 80 and 160 meters should be used for longer distance contacts. There is no specific law on this usage but it is good operating procedure to use VHF and UHF for local communications.

When testing a transmitter, most tests should be conducted without using an antenna. Hook a "dummy

load" up to your transmitter antenna terminal instead. This dummy load simulates an antenna but avoids interference with other stations.

When using Morse Code, call or transmit at the same speed that you feel comfortable copying. The other station will assume that you want him or her to respond at about the same speed.

On many FM repeaters such as the NOFARS W4IZ system, an "autopatch" is provided so that users can tie into the telephone system to make phone calls. This device allows you to use your VHF or UHF rig like a mobile telephone.

When calling another ham station on a repeater, just give the other stations callsign followed by your call. Youi might want to repeat that sequence thirty seconds or so later in case the target station missed part of your first transmission.

A "courtesy tone" is inserted by many repeaters automatically after a user stops transmitting. This is not used on the W4IZ system but is found on most on most other repeaters. It is similar to what CB operators call a "roger beep."

If you wish to join a conversation already in progress, when there is pause between transmissions, just insert your callsign. There is no need to say "break."

During high usage hours between 7 to 9AM and 4 to 6PM, repeaters mainly should be devoted to mobile and low powered stations using short transmissions. Lengthy messages and monologues should be avoided.

On Morse Code, instead of sending "this is" between the callsign of the station of being called, we use the two letters DE. Thus if W4IZ was calling W4ABC on CW, the correct format would be W4ABC DE W4IZ.

13. Subelement T2 Group B

Yahoo group: NOFARSHamAcademy
Date: 2001-10-15 15:05:40 UTC
From: Billy F. Williams
Topic: 13 Message: 13

These 11 items deal with operating procedures and
repeater coordination.

A repeater is an automatic device, usually with a tall
antenna up several hundred feet. To use a repeater,
you transmit your signal to the repeater on it's input
frequency. For example, the W4IZ two meter repeater
has an input frequency of 146.100 MHz.

The repeater picks up this signal and retransmits it on
an output frequency. This is 146.700 for the W4IZ
repeater. The difference between the two frequencies
is called the "offset." On two meters this is normally
600 KHz (.6 MHz)

Many repeaters contain a hookup to the telephone system
through an automatic phone patch or "autopatch."

Transmissions made through repeaters should be short
(a minute or so or less) so that mobile stations can
break in if help is needed. Most repeaters have a
"time out timer" that turns off the repeater transmitter
temporarily if a transmission exceeds a time limit.

Some repeaters require that users mix in a tone with
their transmissions for the repeater to respond. This
helps minimize interference when propagation is long.
This tone is called a CTCSS meaning Continuous Tone
Coded Squelch System.

While any properly licensed ham can use a repeater, the
primary purpose of the repeater is to boost the weak
signals of mobiles and other low powered stations and
thereby extend the range.

Many repeaters are "open" repeaters meaning that any
properly licensed operator can use the system. These
are generally supported by clubs or groups. It is
recommended that those using a system support the group
that sponsors the repeater. Some expense is required
to maintain a repeater especially one with an autopatch.

Other repeaters are closed meaning that only a select group
is invited to use the system. These are popular in some
other areas but there are very few closed systems in
Northeast Florida.

Any ham can install a repeater. But in most areas, a
prospective repeater operator must apply and be coordinated
by a state or regional body such as the Florida Repeater
Council. If a repeater is uncoordinated and causes
interference, it is the responsibility of the uncoordinated
repeater operator to solve the interference problem.

It is recommended that stations pause briefly (a second or
two) between transmissions on a repeater so that another
person, especially someone with an emergency, can break in.

When possible, use "simplex" communications instead of a
repeater. This is direct communications. There is no offset
on simplex since both stationsuse the same frequency.
A popular simplex frequency on 2 meters is 146.52 MHz

Again, the standard offset for 2 meters is 600 KHz
or .6 MHz. For 1.25 meters (220 MHz), the standard
offset is 1.6 MHz. For 70 centimeters (420-450 MHz),
the offset is 5 MHz. Memorize these offsets.

Billy Williams, N4UF

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14. Subelement T2 Group C

Yahoo group: NOFARSHamAcademy
Date: 2001-10-16 18:52:25 UTC
From: Billy F. Williams Jr
Topic: 14 Message: 14

This group of 11 items is a continuation of T2B and concentrates on operating procedures.

On VHF bands such as 2 meters, an operator can use SIMPLEX. One channel is used and each operator takes turns in transmitting. Only one frequency is required and no repeater hardware is involved. Simplex is appropriate for higher powered base stations. Simplex is ineffective for mobile stations if the distance exceeds five miles or so.

Simplex should be used when direct contact is possible without using a repeater. Repeater use is appropriate when simplex communications is not possible. A repeater system requires two channels--an INPUT and an OUTPUT.

In giving signal reports to other operators, the RST system is used. This means READABILITY, SIGNAL STRENGTH and TONE. Tone is only used to rate Morse Code signals.

On voice use the RS system. Readability is based on a scale of 1 to 5 with 5 being perfect readability. Signal strength is on a scale of 1 to 9. A good report would be 59.

The term CQ means "a general call to any station." This can be used to start a contact. CQ is seldom used on VHF or UHF. CQ is mainly heard on long distance bands (HF).

A QSL card is written confirmation of a contact. Many hams collect QSL cards to earn awards such as WAS for contacting all 50 states or DXCC for contacting at least 100 countries.

When calling CQ, say CQ three times followed by "this is" and your callsign three times. When answering a CQ, give the other stations call first followed by "this is" and your callsign three times.

On VHF bands such as 2 meters, a better way of stating signal strength is by observing if the random noise or static disappears when that station transmits. This is termed "full quieting."

15. Subelement T2 Group D

Yahoo group: NOFARSHamAcademy
Date: 2001-10-18 15:40:56 UTC
From: Billy F. Williams Jr
Topic: 15 Message: 15

Eleven more items dealing with operating procedures comprise this group.

A Distress condition occurs when there is danger of loss of life, serious injury or extensive property damage if action is not taken immediately. An example would be a sinking ship or an aircraft in danger.

When making a distress call, the code word MAYDAY is used on voice. On Morse Code the sequence is of course S O S.

If you are operating low powered VHF/UHF equipment especially, you should summon assistance on a repeater. Wait until there is a pause and simply say "break" or "break emergency." Follow this with your callsign.

The Amateur Radio Emergency Service (ARES) is organized by the American Radio Relay League (ARRL)--the national organization of hams. ARES activates nets when requested by relief agencies and government officials.

During these nets, stations must still give their calls every ten minutes. But usually, operators will be identified by a "tactical designation: such as Checkpoint 1, Net Control, Fire Dispatch, Weather Office, etc. Use of tactical designations speed up communications on the net.

Many hams are well prepared to assist in emergencies. In Crown ARES district (NE Florida), the Neighborhood Ham Program encourages hams to help neighbors when widespread utilities outages occur. Hams can summon emergency assistance using a net. It is recommended that Neighborhood Hams have a back up source of power that does not depend on commerical power. This can be a storage battery or a backup generator.

If you rely on batteries, it is good to have several batteries. If you have a means of charging one battery, you can have two batteries and rotate these by charging one while using the other.

Besides the Distress or emergency category, there is the PRIORITY designation for less critical situations. For example, a slow leak in big ship that is not in immediate danger of sinking would be an example of a situation that has TIME VALUE. This would be a priority (but not an emergency) situation.

Under DISTRESS and PRIORITY messages based on importance is the HEALTH & WELFARE (H&W) category. This category relates to messages to and from victims of a hurricane or other event where relief agencies are involved. For example, you might have a neighbor who has a relative in an area where a hurricane just passed through. A message might be sent via Amateur Radio to the affected area inquiring about the status of that relative. The message going into the affected area is termed incoming H&W and the reply would be outgoing H&W. Outgoing H&W always has priority over incoming H&W.

A simple antenna that is easy to construct and install is the DIPOLE. Such an antenna is a good choice for emergency operation. Regular antennas might be destroyed in a storm, so it is good idea to have a spare dipole to install after winds subside. You will learn more about dipoles and antennas later.

Every June, the North Florida Amateur Radio Society and over 3,000 other groups nationwide hold a Fied Day. Operators try to make as many contacts as possible in a 24 hour period using only backup antennas and emergency power. Dipoles are constructed on Friday afternoon of Field Day weekend. This provides an excellent opportunity for newcomers to gain hands-on antenna construction and operating experience.

Some government agencies have their own organizations of Amateur Radio operators. These are called RACES groups. While ARES can serve many agencies, RACES groups work only for a government agency. RACES drills are limited to one hour per week.

During a drill, all messages should be identified as drill or test messages so that no one mistakes such messages for actual messages to be acted upon.

16. Subelement T2 Question Group E

Yahoo group: NOFARSHamAcademy
Date: 2001-10-21 23:20:49 UTC
From: Billy F. Williams Jr
Topic: 16 Message: 16

This question group deals with various modes of operation.

On voice, it is good practice to use standard phonetics when giving callsigns and spelling difficult words and names. Review the Phonetic Alphabet that was covered in an earlier post.

Besides the voice mode, an Amateur Radio operator may use RADIOTELETYPE (RTTY). This mode can be handled by using a Personal Computer hooked to a transceiver. A device known as a TERMINAL NODE CONTROLLER (TNC) is used to manage the interaction between the radio and computer.

Computers can communicate using a special RTTY submode termed PACKET.
A message is broken down into small segments called packets, passed through a wireless network and then reassembled by the receiving computer. Internet uses a similar system.

To use packet, you get CONNECTED to a packet radio link. Clubs and groups operate such hardware. The transmitting station computer sends data to the receiving station computer. The receiving station computer acknowledges that data is being received correctly.

When a packet radio/computer is MONITORING, it receives data but does not give acknowledgement responses.

To extend distances, digital repeaters are placed every 30 miles or so to relay messages over longer distances. These automatic digital repeaters are called DIGIPEATERS.

Digipeaters and other communications hardware are arranged into NETWORKS to facilitate communications.

When operating using a digital mode, band segments designated for voice should not be used. Special band segments are recommended for packet and digital communications.

Technician licensees can use all modes on bands above 50 MHz.(6 meters) but cannot use CW and SSB on frequencies below 50 MHz (High Frequency bands) unless a 5 word per minute Code test is passed.

When using RTTY, your system should reply to the other computer at about the same speed in both directions.

You may not operate your Amateur Radio station on board a commercial airliner or ship unless the pilot or captain gives you specific permission to do so.

You may operate at any location in the United States. You are not limited to operation at the home address shown on your license.

17. Recap of Subelements T1 & T2

Yahoo group: NOFARSHamAcademy
Date: 2001-10-24 17:20:13 UTC
From: Billy F. Williams Jr
Topic: 17 Message: 17

We have completed the material on FCC Rules (T1) and Operating Procedures (T2). These two elements represent 40% of the question pool. Unfortunately, some memorization is required to become proficient with these elements.

Take some time to review previous postings. Emphasize these points:

(1) Role of FCC
(2) Purposes of Amateur Radio
(3) Band Assignments and Frequencies (dial readings)
(4) Control Operator Concept
(5) Station ID requirements
(6) Third Party Communications
(7) Voice & Digital Repeaters
(8) Distress & Emergency Messages
(9) Simplex Vs. Repeater Operation
(10)Modes of Operation: Voice (AM & FM); Digital; Radioteletype; Amateur TV;CW
(11)Harmful Interference
(12)Use of Phonetic Alphabet
(13)Beacon Operation

Beginning with Subelement T3, the emphasis shifts to electronic theory. T3 deals with radio wave travel (propagation). Future subelements will cover basic DC and AC theory.

It is a good idea to get a DC/AC textbook. Such books are standard and may be old editions. These can be found at used book sales very cheaply. Explanations on current, voltage, resistance, power and other concepts may assist you in comprehending the material.

Learning DC and AC theory from scratch is time consuming. College courses covering such material can last several terms. Fortunately, to pass the test does not require the same thorough knowledge that would be required for an engineering graduate.

Since we have covered over 40% of the question pool, you can begin taking sample tests that are offered on several Internet sites. Using a search engine, type in terms such as "Amateur Radio Technician Exam" or "FCC Element 2 Examination" and you will get several links to such tests. Repetition is very important to passing the exam. Concentrate on items that you miss on sample tests.

18. Good Reference Books

Yahoo group: NOFARSHamAcademy
Date: 2001-10-25 19:16:59 UTC
From: Billy F. Williams Jr
Topic: 18 Message: 18

The American Radio Relay League (ARRL) publishes books that can be assistance to those needing background information on question pool items.

Good references for students to have that are published by ARRL include:

Understanding Basic Electronics (publication #3983)------$20

The ARRL's FCC Rule Book (publication #7857)--------------$12

The ARRL Operating Manual (publication #7938)-------------$25

For information on many facets of Amateur Radio including specialty modes, the ARRL Handbook is available in print and on CD.

These and other publications may be ordered via www.arrl.org/shop or phone 888-277-5289.

Some ARRL publication catalogs will be available at the November 8th meeting of the North Florida Amateur Radio Society--7:30PM at Ed White High School.

A good source of information on equipment are ham radio magazines that are found on most newsstands. CQ magazine is widely available and contains many ads referring to study material sources.

19. Subelement T3 Group A

Yahoo group: NOFARSHamAcademy
Date: 2001-11-03 19:35:30 UTC
From: Billy F. Williams
Topic: 19 Message: 19

Subelement T3 deals with travel (propagation) of radio signals. A radio transmitter generates magnetic disturbances that can detected over long distances.

These disturbances have both an electrical and magnetic components. The radio transmitter causes a movement of electrons to occur in the antenna. The antenna converts the electron movement into magnetic impulses.

After traveling through free space, the signal is intercepted by the receive antenna. The signal consists of magnetic patterns that comprise the information to be conveyed.

When a radio signal is received, the receiving antenna converts the magnetic impulses into an electron flow that is processed by the receiver.

As distance increases, the strength of the magnetism weakens. When using frequencies above 30 MHz, the wave travel stays near the surface of the earth.

Therefore signals above 30 MHz---usually referred to as Very High Frequencies (VHF) and Ultra High Frequencies (UHF)--- usually die out after 30 to 50 miles. This is referred to as LINE OF SIGHT PROPAGATION.

FM Broadcast and Television broadcast stations employ Line of Sight propagation for their over-the-air transmissions. The same characteristics apply to ham radio two-meter, 1.25 meter and 70 cm. wave travel.

The ionosphere is not involved with Line of Sight propagation.

Longer distances can be covered by using IONOSPHERIC PROPAGATION. The Ionosphere is a layer of gasses about 40 to 400 miles above the surface of the earth. It is activated by ultraviolet radiation that is contained in sunlight.

When excited by ultraviolet light, the ionosphere has the capability of bending radio waves back to earth. However, ionospheric propagation is only usually useful only for frequencies below 30 MHz. Frequencies above 30 MHz usually pass straight through the ionosphere without being reflected back to earth.

The ionosphere actually consists of several layers of gasses.
Each layer has different characteristics. The lowest layer--
the D Layer--starts at 40 miles altitude. It absorbs radio
signals like a sponge. Fortunately, the D layer disappears at
night and only affects low frequencies below about 5 MHz.

The E Layer starts about 70 miles up. It is responsible for
medium distance propagation although under certain conditions,
it also can absorb radio signals.

The highest layer is the F Layer. Using this layer allows
worldwide wireless communications. During the day, the F
Layer breaks down into two distinct layers--called F1 and F2.

At night, the F Layer consolidates.

Again, the ionosphere usally only affects signals below 30 MHz.
On rare occasions, the ionosphere might affect signals up to 300
MHz or so. Channel 2 TV for example starts at 54 MHz.
On certain days one might be able to receive TV signals from Mexico
or the midwest due to the ionosphere. But this only happens maybe ten
times per year.

Future question groups will deal with other methods of propagation.
For now, become familiar with LINE OF SIGHT (sometimes called ground
wave) and IONOSPHERIC (sometimes called "skip") propagation.

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20. Subelement T3 Group B

Yahoo group: NOFARSHamAcademy
Date: 2001-11-03 20:20:19 UTC
From: Billy F. Williams
Topic: 20 Message: 20

The troposphere is below the ionosphere. While the troposphere has little effect on radio signals below 30 MHz, it can enhance VHF and UHF signals(those above 30 MHz).

One method of enhancement that can be caused by the troposphere is DUCTING. Radio signals enhanced by ducting can travel much further than the 30 to 50 mile line of sight limit. Ducting can cause signals to travel up to several hundred miles. But it occurs only for several hours at a time and may not occur for weeks. Ducting is unpredictable and cannot be counted upon.

Ducting occurs when a signal bounces back and forth between layers of the troposphere. This effect is similar to cold air in an AC system bouncing off the sides of metal ducts on the way to a destination.

Ducting is usually associated with weather fronts and is most noticeable during a temperature inversion. While ducting can enhance our signals on VHF (2 meters), it is most common on frequencies above 300 MHz (UHF).

A stable high pressure area encourages ducting.

As a signal travels further in the troposphere, the signal strength decreases.

The greater the distance of signal travel, the greater the signal loss. This type of loss is termed "path loss." The higher the frequency in MHz, the greater the path loss.

A specialty mode used by some hams is "moonbounce." This is called E-M-E or Earth-Moon-Earth. A signal is aimed toward the moon using a high gain, directional beam antenna. The signal then bounces off the moon and returns to earth. E-M-E requires relatively high power and a very good antenna in order to overcome the path loss caused by the long distance to the moon and back.
A YAGI beam antenna can be used effectively for E-M-E.

Satellites are much closer to earth and can be used to relay signals as long as the satellite is "in view" of both stations. Generally, we use low power when conducting satellite relays. Less power is required if the satellite is close to overhead. More power is needed if the satellite is low on the horizon.

----- End forwarded message -----

Billy Williams, N4UF

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21. Subelement T3 Group C

Yahoo group: NOFARSHamAcademy
Date: 2001-11-12 13:45:24 UTC
From: Billy F. Williams
Topic: 21 Message: 21

So far, we have covered these radio signal propagation classifications: Line of Sight (Ground Wave); Sky Wave (Skip) and Tropospheric Ducting.

Below 30 MHz, most communications employ Sky Wave. Above 30 MHz, Line of Sight is the key type. On occasion, Ducting can provide a temporary enhancement.

This group of questions deals with the 3 or 4 layers of the ionosphere that affect radio signals. Remember that the lowest layer is the D LAYER and that the D LAYER absorbs radio signals. Fortunately, the D Layer disappears at night and affects signals only below 5 MHz.

The F Layer is the highest above the earth and is the most effective for long distance worldwide communication.

The F Layer splits into two sublayers during the day--the F1 and F2. At night, the two sub-layers combine.

The E Layer can either absorb or reflect depending on other conditions.

When the ionosphere acts erratic, long distance signals will fade in and out very quickly. This type of propagation is called SCATTER.

If the frequency of a radio signal is too high, that signal passes on through the ionosphere without being reflected and is lost. Signals below a certain frequency are reflected back to earth. The cutoff frequency above which signals are not reflected by the ionosphere is termed the MAXIMUM USEABLE FREQUENCY (MUF)

When using Sky Wave and the ionosphere, signals closer than a couple hundred miles will not be heard since the wave skips over close in areas. This short distance area is called the SKIP ZONE.

The effectiveness of the ionosphere depends mainly on the ultraviolet (uV) radiation contained in sunlight. The more active the sun, the higher the MUF and the more effective that the ionosphere is in reflecting radio waves.

This uV radiation is tied closely to the number of "spots" on the sun (sunspots). Sunspot activity varies over an 11+ year cycle. The more sunspots, the higher the ionization

of the ionosphere and the more effective that it is in
reflecting signals.

Billy Williams, N4UF

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22. Subelement T4 Group A

Yahoo group: NOFARSHamAcademy
Date: 2001-11-17 16:28:30 UTC
From: Billy F. Williams
Topic: 22 Message: 22

These items deal with lightning protection and tower/antenna safety.

Your transmitter (or transceiver) sends your signal through a transmission line or wire to an antenna. The transmission line usually is coaxial cable which is very similar to cable television wire. The line may be anywhere from a few feet to several hundred feet in length. When the antenna is not in use, the end of the line connected to the transmitter should be grounded for lightning protection. If you have several antennas and transmission lines, the ones not in use should be grounded. This is usually accomplished by using a suitable antenna selector switch that provides grounding of unused antennas automatically.

Although lightning arrestors can be helpful, the best protection is to disconnect all antennas and power cords going to your equipment when you leave. The same goes for computers. Don't forget to disconnect your modem line. This is most urgent during lightning season.

The metal casing of a piece of equipment is called the CHASSIS. The chassis of all gear should be grounded at all times. For maximum lightning protection, there should be an 8 foot copper ground rod driven into the ground just outside your operating position. A heavy wire should be run from the ground rod into your operating room and attached to the metal chassis of all gear that has a metal chassis. While the power line will provide some grounding, it cannot be counted upon.

Grounding also minimizes shock hazard to operators.

Care must be taken when removing the cover from electronic gear. Some gear has interlocks. An interlock is a switch that automatically disconnects power when the cover is removed. It is not good policy to jumper or defeat interlocks.

If you are on the ground assisting with installation of a tower/antenna, you should wear a hard hat and safety classes. This protects you from being injured by a piece of dropped hardware.

When climbing a tower to work on the antenna, a safety harness should be used to minimize chances of falling.

Wire antennas may be installed using a bow and arrow or a slingshot. But be careful to make sure that the device is working correctly and that nothing is in the projected flight path. Also, the line should be strong enough to handle the job.

Keep all antennas and wires clear of power lines. If there is the slightest chance that an antenna might fall across a power line, install the antenna somewhere else!

Sometimes, we need to check a transmitter without radiating a signal. To do this, disconnect the transmission line/antenna from the transmitter and hook up a DUMMY LOAD. This simulates a standard antenna without causing a signal to be radiated. The dummy load absorbs all the power. The dummy load must be rated to handle the power that your

transmiter produces.

On older, less complicated transmitters, a 100 watt or so light bulb could be used to absorb the power instead of a dummy load. However, modern transceivers cannot handle the mismatch that results and the gear may be damaged by using a light bulb instead of a dummy load.

When working around electricity, voltages of over 20 or 30 volts can be lethal. Voltage is electronic pressure or force and if too many electrons are forced through your body, your essential organs stop functioning correctly. Your nervous system is overridden with catastrophic results.

More on this in the next question group.

23. Subelement T4 Group B

Yahoo group: NOFARSHamAcademy
Date: 2001-11-21 03:52:46 UTC
From: Billy F. Williams
Topic: 23 Message: 23

Equipment that plugs into a standard electrical outlet is powered by 120 volts (plus or minus a few volts) alternating current (AC). With AC, the electrons alternately travel in one direction and then the other as the terminal polarity changes. U.S. commercial power is based on 60 round trips per second. This is termed 60 cycle or 60 Hertz AC.

Internally, most equipment has a power supply that converts this 120 volts AC into a lower voltage Direct Current (DC). In a DC circuit, the electrons only travel in one direction as the terminal polarity does not change. Most ham gear uses 12 volts DC since this amount of force also can be obtained from an auto battery. Computers generally use 12 volts and 5 volts DC (or less in some cases).

The voltage is decreased from 120 volts down to 12 volts by using a step down TRANSFORMER. The AC (two way current flow) is converted to DC (one way current flow) by use of a RECTIFIER circuit. The POWER SUPPLY includes both a rectifier circuit and a step down transformer along with other circuitry.

The power supply line cord that plugs into the 120 volt wall outlet has three wires. The GREEN wire is GROUND while the WHITE wire is called the NEUTRAL. The BLACK wire (sometimes RED) is the HOT wire.

Electrons flow back and forth between the hot and neutral wires to power the equipment. The flow of electrons is called the CURRENT. When electrons move, work is accomplished.

The green ground wire is hopefully connected to the earth ground through your house wiring.

The force that pushes and pulls electrons through a wire or path is called VOLTAGE. Another name for voltage is ELECTROMOTIVE FORCE--the force that moves electrons.

You should be very careful when working around circuits with voltages of over 20 or 30 volts. This amount of force can cause electrons to flow through YOU if you inadverently become part of the circuit.

Current is measured in AMPERES or AMPS. It only takes about 1/10th of an amp to affect your nervous system and heart. This amount of current also can be stated as 100 MILLIAMPERES. And it can be deadly.

When you get your transmitter, you will connect one end of a transmission line(usually coaxial cable)to your transmitter's RF output connector and the other end to an antenna. It is important that the IMPEDANCE rating of the transmission line be equal or very close to the impedance rating of the antenna.

If the antenna and transmission line have equal impedances, there is a 1:1 match (pronounced 1 to 1) and the antenna will accept 100% of the power from the transmitter and radiate it as signal. This 1:1 rating is called the STANDING WAVE RATIO or SWR.

If there is not a match, the SWR will be greater than 1:1. The higher the SWR, the less efficient the system will be and the result will be a weaker signal being received on the other end.

If the transmission line impedance is 75 ohms and the antenna has a 50 ohm impedance for example, the SWR would be 75 dividied by 50 or 1.5:1. About 4% of the signal would be lost due to the mismatch. This is tolerable but just barely so.

If the SWR is over 2:1, the antenna needs to be tuned for a closer match. In many cases, the antenna is too long and must be shortened for better operation.
An SWR of 2:1 translates into 10% of the power from the transmitter output being wasted and not radiated. Extra heat is created from the unradiated power that can burn out the transmitter semiconductors.

The SWR can be determined by using an SWR METER (also called an SWR BRIDGE). This item is relatively inexpensive and can let you know when you have antenna or transmission line problems.

When using VHF bands, you should have an SWR meter specially rated to work above 30 MHz. This will give the most accurate reading although in a pinch you can use a regular SWR meter as long as the meter can be calibrated.

When checking electronic equipment, it is helpful to be able to measure current and especially voltage. A VOLTMETER measures current while an AMMETER measures current. An OHMMETER can be used to measure opposition to current flow.

One meter called a MULTIMETER can be used to measure all three. The multimeter is the most basic piece of test equipment.

The voltmeter is easiest to use. You simply connect the meter across the component or device to be measured. This is done easily and quickly.

Troubleshooters loathe having to read current since the circuit must be broken and the meter inserted in series with the circuit. This is difficult when working with small printed circuit boards inside modern gear.

Fortunately, we can determine current when voltage and resistance are known by using a simple formula called Ohm's Law.

POWER is the combined effect of voltage and current. To get the power (P), simply multiply the number of amps times the voltage. For example, a TV set that uses 120 volts at 2 amps would have a power rating of 240 watts. The unit of power is the WATT.

A thousand watts is called a KILOWATT. Wattage can be measured with a WATTMETER.

24. Subelement T4 Group C

Yahoo group: NOFARSHamAcademy
Date: 2001-11-22 19:46:42 UTC
From: Billy F. Williams
Topic: 24 Message: 24

Meters are used to determine the amount of electrical force (Voltmeter), the number of electrons flowing per second (Ammeter), the amount of energy expended (Wattmeter) and the amount of opposition to the movement of electrons (Ohmmeter). A multi-purpose meter is termed a MULTIMETER.

More complex meters can be assembled to measure the effectiveness of an antenna (Standing Wave Ratio Meter)system and for other diagnostic purposes.

The easiest meter to use is the VOLTMETER. You just touch one of the two probes to each and of the item to be tested. This is called PARALLEL connection. Checking the state of a battery with a "tester" is an example of measuring voltage. Because voltage is so easy to measure, technicians greatly prefer making voltage readings over making current/ammeter readings.

To read current (the number of electrons moving through the circuit and meter each second), a SERIES connection is required. This requires cutting the circuit path--a time consuming process with modern printed circuit board construction.

Although some large scale ammeters used by electricians, called "clamp-on meters" can measure current indirectly without cutting the circuit wires and inserting the meter (and then repairing the wires back when finished)--these are not reliable for the relatively small amounts of current used in electronic circuits.

A wattmeter measures the combined effects of voltage and current. DC wattmeters are used to measure power consumption.

Radio Frequency (RF) Wattmeters are used to measure the amount of work that a radio transmitter accomplishes in the production of a signal (RF energy). RF Wattmeters should be hooked directly to the transmitter output jack.

The OHMMETER reads electrical RESISTANCE. Resistance is the amount of opposition that a material or component offers to the movement of electrons(current) through it. A complete length of wire should have very low resistance unless it is broken. If the wire is broken, it will have very high (almost infinite) resistance.

One important precaution! When using an ohmmeter, do not use it in a circuit that is energized. The meter probably will be damaged.

Make sure the meter selector switches or buttons are set to read what you intend to read. Don't inadvertantly read voltage with the meter set up to read resistance.

If you read current, make sure the meter can handle the amount of current that you wish to read. For example, if you expect 3 amperes, don't measure that much current with a meter only set up to read 1 ampere. Use a higher range or get a more rugged meter.

With the newer digital readout meters, this is not usually a big deal. You just get an overrange display that prompts you to increase the range setting. But with older analog (needle type) meters, this precaution is very important.

For a standard installation, all items in the transmission path should be rated for a 50 OHM IMPEDANCE. Impedance is a property similar to resistance but cannot be read on a standard ohmmeter. A special meter called an IMPEDANCE BRIDGE is needed. Usually it is not necessary to read impedance if you use items that are of known values. Impedance can be read indirectly with the SWR bridge.

For best results make sure that your transmitter output circuit, your transmission line and your antenna are rated for 50 OHMS IMPEDANCE. Becuase this value is so standard, it is hard to find items using impedances of other than 50 ohms. All commercial ham transceivers accommodate a 50 ohm impedance.

For cable TV work, a 72 ohm impedance standard is used. So you may hjave a slight mismatch if you use cable TV coax instead of communication coax which is 50 ohms.

A special type of wattmeter called a DIRECTIONAL WATTMETER is used to measure power that is turned into radiated signal (FORWARD POWER) and the amount of power reflected back down to the transmitter (REVERSE POWER).

Obviously, we want to have 100% forward power and 0% reflected power. This corresponds with an SWR reading of 1:1. If we have impedance mismatches, reflected power is produced. At worst, we want at least 90% of our power classified as forward power and 10% as reflected power (an SWR of about 2:1).

Also, we should make sure that the total power never exceeds the power limit for our class of operation. This should be done using a PEAK READING WATTMETER--a specially modified type of meter. Many directional wattmeters can be converted to peak reading wattmeters by throwing a switch or pressing a button.

If too many electrons move per second, the friction and heat produced by the movement will cause a fire hazard. This "electron stampede" is usually caused by loss of resistance. Until the circuit can be repaired, it is extremely important that the electron flow be stopped. This is the purpose of a FUSE.

Your electrical circuits in your may use fuses to prevent fires caused by electrons running out of control. Fuses must be replaced. However, CIRCUIT BREAKERS can be reset. Most modern homes use circuit breakers but many electronic items still use fuses. A circuit breaker is the equivalent of a reuseable fuse.

If you have to replace a fuse, always replace it with one of an equal value. If a 15 ampere fuse is bad, once you fix the circuit, replace it with another 15 ampere fuse. Putting in a 30 ampere fuse instead could cause a fire.

Review the concepts of voltage, current, resistance and power. These concepts will be tested in greater detail when you upgrade. A basic electronics textbook or manual is recommended to get a better understanding.

Even an old edition of a DC/AC textbook can help since this theory does not change--although the devices that apply it do change, but not very quickly.

ARRL has several publications available. Consult the publications section of the website at www.arrl.org or look at a recent copy of CQ magazine or QST. These can be found on most newsstands.

We are now over 50% complete with the 384-item question pool for Element 2. At this rate, we should finish before the next NOFARS exam session on Thursday, February 7th, 7PM at Regency Mall in Suite 800.

25. Subelement T4 Group C

Yahoo group: NOFARSHamAcademy
Date: 2001-11-25 22:15:48 UTC
From: Billy F. Williams
Topic: 25 Message: 25

RADIO FREQUENCY INTERFERENCE (RFI) occurs when a transmitter interferes with another piece of equipment, usually a consumer device such as a TV, VCR, telephone or sound device.

RFI may be caused by an improperly constructed or misadjusted transmitter or by poor design of the device suffering the interference.

The operator of a transmitter is responsible for making sure that his or her transmitter is properly adjusted. It should only produce a signal on one frequency.

If a transmitter or transceiver produces a substantial signal on any frequency other than the one dialed in (called the FUNDAMENTAL FREQUENCY)--the transmitter must be removed from service until repairs are made.

The most common type of "extra" signals are HARMONICS. These are whole number multiples of the fundamental frequency. For example, a transceiver adjusted for intended operation on 7.1 MHz might also produce a second harmonic on 14.2 MHz. It even may produce a third harmonic on 21.3 MHz.

If these harmonic signals can be detected more than a block or two away, then the transceiver is defective. Even weaker harmonics can cause interference to TV sets and other consumer grade receivers. Most manufacturers design harmonic filters into their transceivers to make the harmonics as weak as possible. External harmonic filters also can be purchased to beef up protection.

The most common type of harmonic filter is called a HIGH PASS FILTER. It is attached to the receiver suffering the interference. It is most effective against harmonic reception but is not effective against a defect known as FRONT END OVERLOAD or RECEIVER OVERLOAD.

Front end overload is usually recognized when the interference to reception occurs on all channels rather than just a few. For example, if your TV receives interference from your transmitter on only two or three channels, front end overload is not the culprit. If the interference affects most or all TV channels, then it probably is caused by front end overload.

Front end overload is caused by a very strong signal coming into a poorly designed receiver. The best cure to front end overload is to increase the physical separation between the transmitter and the receiver suffering from interference. In many cases, doubling the distance will reduce interference potential by 75%.

Another strategy to minimizing interference caused by harmonics is to install a LOW PASS FILTER on the transmitter or transceiver. Again though, this will not prevent front end overload.

When trying to solve an interferemce problem, first make sure that all antenna connectors on both devices are tightened. Also make sure that the transmitter is grounded as described in a previous post.

Making sure that connectors are tight and not full of water (in the case of outside connectors) is especially important if the receiver suffering interference is hooked to the Cable TV system. Even loose connectors on the pole can allow signals to leak in. Ask the cable provider to check their system as an early step.

If a neighbor complains of interference, see if your transmitter interferes with your own television. Put a TV set within 10 feet or so of your transmitter and note the results. If there is no interference to your set, then the complainer might have front end overload due to poor receiver design. You are not usually responsible for curing this.

If you interfere with your TV or with several other sets, then you should check for harmonics.

The transmitter licensee is responsible for solving interference problems due to harmonics.

The next post will deal with electrical units and prefixes. These were covered earlier and should be reviewed. Prefixes such as kilo, milli, micro, kilo, nano etc. will be attached to units such as the volt, ohm, ampere, etc.

26. Subelement T5 Group A

Yahoo group: NOFARSHamAcademy
Date: 2001-11-30 18:16:00 UTC
From: Billy F. Williams
Topic: 26 Message: 26

It is very important to memorize these metric prefixes. Prefixes are attached to electrical units to modify the meaning.

The unit of FREQUENCY is the HERTZ(Hz). The old term for Hertz was CYCLE. Dial readings are stated in Hertz.

1,000 Hertz equals 1 KILOHERTZ (KHz). 1,000,000 Hertz equals 1 MEGAHERTZ (MHz). 1 MEGAHERTZ also equals 1,000 KILOHERTZ. Know thoroughly the relationship between Hertz, Kilohertz and Megahertz.

To convert KHz to Hertz, multiply by 1,000 or just add three zeros. 28,450 KHz equals 28,450,000 Hertz.

To convert KHz to MHz, divide by 1,000 or move the decimal point three places to the left. 14,300 KHz equals 14.3 MHz.

Other prefixes involve units smaller than one. 1/1000th of any unit is a MILLI--while 1/1,000,000th of any unit is a MICRO--. 1,000 MICROs equal 1 MILLI.

Milli and Micro are often used to measure the amount of current flowing. Remember that 1,000 milliamperes equals 1 ampere. 3,000 milliamperes equals 3 amperes.

Another term for VOLTAGE is ELECTROMOTIVE FORCE--the force that moves electrons. Without this force or voltage, no electrons can move significantly. When your battery voltage deteriorates, the number of electrons flowing is reduced and eventually stops.

Besides voltage, an electron path is needed. A material that easily forms an electron path is a CONDUCTOR. A metal wire can be thought of as a conductor.
Electrons move most easily through metal. Four metals used are COPPER, SILVER, ALUMINUM and GOLD. The most common conductor used is copper since gold and silver are expensive.

A material that blocks electron flow is an INSULATOR. Most insulators are non-metals such as plastic, rubber, mica, porcelain and even dry air. To protect you when using a meter, probes insulated with plastic are used to keep the electrons away from you.

For equipment to operate correctly, the right amount of current must flow through each circuit. If way too much current flows, a fire can be started due to friction and the resulting heat. This is called a SHORT CIRCUIT condition.

If no current flows, this is known as an OPEN CIRCUIT condition.

Fuses or circuit breakers can be used to automatically cut off the power to short circuits before the excessive friction and heat starts a fire.

The property that opposes electron flow is RESISTANCE which is measured in OHMS. 1,000 Ohms equals 1 KILOHM. 1,000,000 ohms equals 1 MEGOHM.

Resistance will be covered in the next post as part of T5B.

27. Subelement T5 Group B

Yahoo group: NOFARSHamAcademy
Date: 2001-11-30 18:43:37 UTC
From: Billy F. Williams
Topic: 27 Message: 27

RESISTANCE is the electrical property that opposes or resists current flow--the movement of electrons. It is measured in OHMS, KILOHMS or MEGOHMS.

One Ohm is defined as the amount of resistance necessary to limit the current to 1 ampere if 1 volt of force is applied.

A component or part manufactured to contain resistance is a RESISTOR. Resistors are among the most common components with hundreds contained in a computer or TV set. Resistors usually contain 4 or 5 color bands that can be deciphered to determine how many ohms are included in the unit. Sometimes, resistors are made together with other parts in an INTEGRATED CIRCUIT.

Each circuit usually contains at least one resistor to control the amount of current moving in that circuit.

A CIRCUIT includes a source of voltage, something to do work called a LOAD, and a complete electron path. An OPEN CIRCUIT means that no current is flowing because the resistance is very high. A SHORT CIRCUIT means that too many electrons are moving usually due to too low of a resistance.

Another component or part is an INDUCTOR (also known as a COIL). The inductor stores magnetism in the area near the coil. The amount of magnetism stored is measured in a unit called the HENRY. In AC circuits, the inductor exhibits a property similar to resistance called REACTANCE. Reactance also can be used to reduce electron flow-but only in an AC circuit. Reactance has no substantial effect in a DC circuit, so resistance must be used. The abbreviation for reactance is X.

A third common part or component is the CAPACITOR. This part stores electrons and positive charges for later use. Just as someone living in a dry area might collect rainwater in a cistern for later use, a circuit can use a capacitor to collect electrons for later use. Even a bank account is a type of capacitor with regards to money. The gas tank on your car is a form of capacitor.

Capacitors can be used to retard the flow of current(just like resistance) in a DC circuit but to allow AC current to flow almost normally. This is done by disrupting the timing (phase) of a circuit. So this is an indirect effect of the capacitor's storage ability. The amount of storage capability of a capacitor is stated in a unit called the FARAD. The larger the Farad (usually stated in microfarads) rating, the more electrons and charges that can be stored inside the unit.

Through formulas, we can determine how many ohms of resistance are needed. If 100 ohms is needed, for example, two 50 ohm units can be used by hooking these in SERIES if a single 100 ohm resistor is not handy.

Inductors also can be hooked in series to increase the amount of magnetic storage capability.

However, capacitors must be hooked in PARALLEL (side by side) to realize increased capacitance ratings.

If an available resistor is too large, two larger units can be hooked in PARALLEL to reduce the ohms. Also inductors can be hooked in parallel to reduce the Henry rating. However, capacitors must be hooked in series for a Farad rating reduction.

Know the symbols used for these three basic components. The resistor is symbolized by a jagged line. The capacitor symbolis two lines (one of which is curved) separated by a small space and the coil looks like a line with several loops.

Consult any reference to see these.

28. Subelement T5 Group C

Yahoo group: NOFARSHamAcademy
Date: 2001-12-02 21:50:20 UTC
From: Billy F. Williams
Topic: 28 Message: 28

This group of items deal with the relationship between the three most fundamental units of electricity.

Review and remember these three units of measurement, the abbreviation and the meaning:

VOLTAGE-The basic unit is the VOLT. The letters E or V can be used to abbreviate voltage. Most Amateur Radio texts and exams use E. Voltage also is known as ELECTROMOTIVE FORCE because it is the force that MOVES electrons.

CURRENT-The basic unit is the AMPERE (AMP). The letter I is used to abbreviate current. Current is an expression of the number of electrons that move in a circuit each second.

RESISTANCE-The basic unit is the OHM. The letter R is used to abbreviate resistance. Resistance is defined as opposition to current flow. The higher the resistance in a circuit, the less current that will flow. On the other hand, if we decrease the resistance, the current flow will increase. If the resistance of a circuit is reduced drastically, we have a short circuit and dangerous amounts of current flow. Resistance is used to control the flow of electrons. Resistance and current are inversely related. As one varies, the other goes in the opposite direction.

Voltage and current are directly related. This means that if voltage goes up, so does current. If the voltage doubles, twice as many electrons are forced through the circuit. If the voltage is reduced, the circuit current decreases proportionately. If your flashlight battery loses voltage over a period of time, less current flows and bulb produces less light.

These two relationships can be combined to allow us to predict an unknown value if the other two properties values are known. For example, if I know the voltage and resistance of a circuit, I can predict the current.

This three way relationship between voltage, current and resistance can be evaluated through a math concept called OHMS LAW.

Memorize these formulas. Even if you are not familiar with basic algebra, you can solve these problems using simple calculator. The formulas are

V=I times R (V=IR) Voltage in volts equals the current in amperes multiplied by the resistance in ohms.

I= V/R Current in amperes can be calculated by dividing the voltage in volts by the resistance in ohms.

R= V/I Resistance in ohms can be calculated by dividing the voltage in volts by the current in amperes.

NOTE: It is important that only basic units be used when doing Ohms Law. If you know the current is 50 milliamperes, this must be converted to read .05 amperes.

Here are some examples. Suppose you have 50 ohms resistance and 2 amperes of current in a circuit but you don't know the voltage. Using the first forumla above V=IR, just multiply 50 times 2 and you should get 100 volts as your answer.

Lets say there are 100 ohms of resistance in a circuit with a voltage of 200 volts. Using I=V/R you would divide 200 by 100 and get 2 amperes as the answer.

Now, we have a fourth property to consider that is actually just the combined effects of voltage and current. This is POWER. Power also is defined as the rate as which energy is used. It is abbreviated with the letter P. The main Power derivation of Ohm's Law is P=IE (Remember like apple pie) although you won't get much involved with power formulas until you upgrade.

Now on to a different topic. We can measure how many times an event occurs each second and express that in terms of CYCLES PER SECOND or HERTZ. One Hertz (abbreviated Hz) equals one cycle or event per second.

If you have a light that blinks three times per second, we could say that the light has a frequency of 3 Hertz.

The distance that an object or effect traveling at the speed of light can go in the time frame of one event is called the wavelength.

Frequency and wavelength are inversely proportional to each other. As one goes up, the other comes down.

Radio waves peak as the energy moves through free space much like rough water is full of waves of water. The distance between the wave peaks is WAVELENGTH whether in water or free space. This distance is measured not in feet but in METERS. A meter is about 39 inches. While we could get an accurate estimate of the distance between peaks with slow moving water, such is impossible to actually determine directly in the case of invisible radio waves. You will not have much on this concept on your Technician exam but the principle is important in designing antennas that will capture the wave energy most efficiently.

Remember that electrons behave in two basically diffferent manners. Some circuits have electron flow in only one direction (much like a one-way street with traffic). This is DIRECT CURRENT or DC. DC is produced by batteries.

The other type of electron circuit behavior involves two way current flow which is called ALTERNATING CURRENT or AC.

While electrons always travel from negative to positive, the AC effect is caused by the voltage source changing polarity very often. An AC device is an unmodified GENERATOR. The constant chaging of the positive and negative polarities at each end of the generator output is due to the rotary motion used by the generator as the windings spin around.

It is not economical to distribute power to customers using DC, so all household electricity will be AC. The problem occurs when a DC device is used by a consumer. Most all electronic equipment including computers operates on DC. To solve this incompatibility, a POWER SUPPLY is usually built into the equipment to convert the AC from the wallplug into DC to be used by the internal circuits. Some equipment requires that you buy an external power supply as an extra accesory.

The next post will deal with some of the components that are encountered in electronic circuits. These components include resistors, fuses, batteries, switches and potentiometers. Learn the symbols for each. We already have studied the resistor, capacitor and inductor. It is a good idea to review earlier posts or consult a basic electronics book.

29. Subelement T6 Group A

Yahoo group: NOFARSHamAcademy
Date: 2001-12-02 22:54:11 UTC
From: Billy F. Williams
Topic: 29 Message: 29

An electric circuit consists of at least three elements:

The SOURCE (of electrons)possesses electromotive force(VOLTAGE) that pushes and pulls electrons through the circuit.

The LOAD is a device that performs useful work. Examples of loads include LAMPS or BULBS (producing light), SPEAKERS (producing sound) and MOTORS (producing motion). Without a load, electrons may move but no useful work will be performed by the circuit. The load converts the electron movement through it into a useful output.

The CONDUCTOR PATH consists of metallic wire or a metal frame of some sort. The path must be complete between the NEGATIVE TERMINAL of the battery, generator or other source and the POSITIVE TERMINAL. Any break in the metal path will cause electron flow to stop.

Electrons leave the negative terminal of the source where they are stockpiled and travel through the wiring and load to the positive terminal that has atoms that attract the electrons. Some engineers trace what is known as "conventional current" and chart charge movement from positive to negative. But this is not electron flow! For Amateur Radio testing purposes, we use "electron flow" to analyze circuits and always trace electron flow from negative (-) to positive (+).

An optional fourth element makes the circuit easier to manage. This is a CONTROL device.

A SWITCH is a control device that starts and stops the electron flow usually with a flip of a lever or button. Think of the elctrons as similar to traffic flow and the switch as a drawbridge span. If the switch is OPEN, then the electrons STOP. If the switch is CLOSED, then electrons move. OFF and OPEN have the same meaning. ON and CLOSED are the same.

The simplest and most widely used switch has only two terminals and looks like a small drawbridge skeleton. This is a SINGLE POLE, SINGLE THROW or SPST switch. A more complex switch called a SINGLE POLE, DOUBLE THROW or SPDT has three terminals and can switch current to one of two circuits. It is also known as an A-B SWITCH.

A RESISTOR is a control device used to reduce current flow. Most resistors are FIXED value and can't be varied but some resistors are VARIABLE RESISTORS. The user changes the ohm value by turning a rotary knob or sliding a lever up and down. A volume control on a sound device and a basic light dimmer are good examples of variable resistor. A three terminal variable resistor is called a POTENTIOMETER or POT.

A FUSE purposely melts down when the circuit current exceeds a safe value. This is done to prevent fires caused by stampeding electrons producing mammoth amounts of friction and heat. The symbols looks a like the letter S turned sideways. When the fuse wire melts, the current stops.

Now back to the battery. It has two terminals marked + and -. The battery symbol consists of two parallel lines separated by a small space. It is similar to the capacitor symbol except that the battery symbol does not include a curved line. The short parallel line

represents the negative terminal (-) and the longer line represents the positive (+) terminal.

A simple single-section battery is called a CELL. Some batteries use several cells. Your car battery actually consists of six separate 2.1 volt battery cells in series that produce a little over 12 volts. The symbol for this type of battery has four parallel lines. The battery is POLARIZED meaning that the terminals must be matched up to the proper wire.

Most other components are NON POLARIZED. With such devices, you can hook either end to the positive and negative feed wires. Resistors are non-polarized. The value in ohms is usually determined by the first three color bands. The fourth band denotes the TOLERANCE. A PRECISION RESISTOR can have a tolerance as low as a tenth of one percent (.1%). These cost extra money so manufacturers usually use resistors with tolerances of 5% or 10%.

Tolerance is the amount of ohms that a resistor can be off and still be considered good. A 100 ohm 5% resistor, for example, could read up to five ohms (5% of 100)off and still be good. The allowable range would be between 95 and 105 ohms.

Our study of components will continue in Element T6 Group B. The switches that we have discussed so far are mechanical. This means these are slow and eventually wear out.

We will study ELECTRONIC switches. These last indefinitely if treated correctly and do not wear out. Just like the tires on your car will eventually lose rubber, mechanical switches will wear out at some point. Electronic or SOLID STATE switches do not.

The simplest electronic switch is the DIODE which has two terminals. A deluxe electronic switch is the TRANSISTOR. It has three terminals called the base, collector and emitter.

Transistors also can be programmed to AMPLIFY or increase the level of signals.

30. Subelement T6 Group B

Yahoo group: NOFARSHamAcademy
Date: 2001-12-02 23:51:15 UTC
From: Billy F. Williams
Topic: 30 Message: 30

These items deal with electronic components and devices. Learn the definition and symbol for each.

TRANSISTOR-This three-terminal device can be used as an electronic switch or as an AMPLIFIER. Basic transistors are PNP and NPN denoting the configuration of the elements. Either type can amplify or switch. The arrow in the symbol points in for a PNP symbol while that arrow points out for an NPN (Not-Pointing-iN)

ANTENNA- Usually consists of wire or metal rods. The symbol looks like a triangle or an upward-pointing V. An transmitting antenna converts the electron flow produced by the transmitter into an radio frequency signal. A receiving antenna converts the magnetic component of the radio signal back into an electron flow that is transferred down the transmission line to the receiver.

EARTH GROUND-The symbol looks like a downward-pointing three-pronged fork.

CAPACITOR-The capacitor symbol consists of two almost parallel lines of equal length separated by a small gap. However, one of the lines has a curve to it.
A variable capacitor has an arrow through the symbol while the basic (FIXED) capacitor does not. It stores energy between the two sets of "plates" in an ELECTROSTATIC FIELD. The amount of capacity for storing electrons and energy depends on the size of the plate area and the material between the plates. The more plate area, the bigger the capacitance rating usually expressed in microfarads (uF) or picofarads(pF)

COIL or INDUCTOR-Represented by several loops. It stores energy in an ELECTROMAGNETIC field. The amount of energy storage can be increased by adding a CORE extending down through the center of the coil.

31. Subelement T7 Group A

Yahoo group: NOFARSHamAcademy
Date: 2001-12-03 00:16:14 UTC
From: Billy F. Williams
Topic: 31 Message: 31

When assembling your Amateur Radio station, you may wish to use several antennas depending on the band you transmit on or the directional pattern desired.

While you could unscrew one connector and hook up another to change antennas (you only use one antenna at a time)--this gets burdensome. By using an ANTENNA SWITCH, you can easily change antennas quickly.

The FEED LINE or TRANSMISSION LINE hooks your antenna to your transmitter OUTPUT connector. Most feed line is coaxial cable that has two conductors. One conductor wire (the outer conductor or shield) encirles the other conductor (inner conductor or center conductor).

If a radio works in your car but not in your house, check the POWER SUPPLY.

To match the antenna/transmission line system to your transceiver/transmitter, an ANTENNA TUNER is used. This is called IMPEDANCE MATCHING.

In hooking up your antenna, connect the transmitter/transceiver to your SWR BRIDGE. Then hook the SWR bridge to your ANTENNA TUNER. Then hook the antenna tuner to your ANTENNA SWITCH.

For voice operation, connect your microphone to the transmitter/transceiver input connector.

To operate a digital mode such as RTTY (radioteletype), remove the microphone and hook your computer and MODEM to the input connector.

Another digital mode is PACKET. It uses a computer and Terminal Node Controller (TNC) that you hook to the transceiver input.

Remember the order of these devices: MODEM/COMPUTER/MICROPHONE to SWR BRIDGE to ANTENNA TUNER to ANTENNA SWITCH to ANTENNAS.

32. Subelement T7 Group B

Yahoo group: NOFARSHamAcademy
Date: 2001-12-03 00:55:14 UTC
From: Billy F. Williams
Topic: 32 Message: 32

This series of questions delves into the internal construction of transmitters and receivers. Understanding this material requires many hours of study. With the development of Integrated Circuit technology, the value of this material is much less than say ten years ago.

Here are some hints on choosing the correct answers. For in-depth coverage, consult a text such as Electronic Communication by Shrader or an ARRL Handbook.

(1) An FM receiver has a stage called a FREQUENCY DISCRIMINATOR to decode the signal. The FM receiver also usually uses a LIMITER stage. Each stage is represented as a "block" on a BLOCK DIAGRAM.

(2) Most transmitters and transceivers use VARIABLE FREQUENCY OSCILLATOR control. This allows the user to change the dial reading very easily. Older transmitters used CRYSTAL OSCILLATOR control which made frequency selection very tedious.

(3) Receivers designed to be used on SINGLE SIDEBAND voice and MORSE CODE (CW) have a block (stage) labelled PRODUCT DETECTOR.

(4)Most commercially manufactured Amateur Radio transmitters and transceivers include a LOW PASS FILTER in the output circuit to reduce HARMONICS which can interfere with reception on nearby recvoiers such as TV sets.

(5)A more elaborate filter used in some gear is a BANDPASS FILTER that gets rid of other "garbage" signals in addition to harmonics. It blocks energy above and below its limits.

(6)Radio receivers can be beefed up against receiving interference by including a HIGH PASS FILTER or BANDPASS FILTER.

(7) All receivers must have a DETECTOR. Even an elementary crystal set has a detector in the form of a crystal diode. You can't have a viable receiver without a detector of some sort.

(8) A DUPLEXER is used on combination VHF/UHF transceivers to accommodate one antenna to serve both the UHF and the VHF section. The duplexer takes output from both the UHF and VHF output connectors and funnels these into one antenna that is rated for use on both bands.

33. Subelement T8 Group A

Yahoo group: NOFARSHamAcademy
Date: 2001-12-03 01:18:15 UTC
From: Billy F. Williams
Topic: 33 Message: 33

When using voice, your transmitter/transceiver produces a RADIO FREQUENCY CARRIER that is encoded with your voice patterns that are picked up by the microphone.

This carrier is varied in certain patterns to convey information. It gets momentarily more and less powerful depending on the instantaneous voice patterns of the output from the microphone.

A good analogy is a person on a ship deck communicating with a flashlight with a nearby ship. By using a flashlight beam, the person can switch the light on and off in specific patterns to get a basic message across to the person on the other ship. The flashlight beam is analogous to the carrier. The message is conveyed by manipulating the beam. The process of encoding information is called MODULATION.

Modulating voice patterns picked up by a microphone is much more complex than simply switching a light on and off but the fundamental idea is similar.

When a transmitter modulates a signal, the amount of band space required increases. Some types or modes of modulation take up more band space than others. The amount of space required is called the BANDWIDTH.

The more narrow the signal bandwidth, the more efficiently we use the radio spectrum. Narrow bandwidths are preferred in order to have space for as many stations as possible in our limited frequency bands.

The most efficient signals are Morse Code which is also called Continuous Wave or CW. Such signals require very little bandspace--about .1 KHz or so depending on the speed of the code. Next best is Radioteletype (RTTY) with a bandwidth of .5 KHz or so. Then, we have Single Sideband (SSB) which occupies about 2 to 3 KHz of space. Least efficient is FM Voice with a bandwidth of 10 to 20 KHz. Know these in ascending order of bandwidth: CW, RTTY, SSB, FM Voice. Also, you may be asked questions on the typical bandwidths occupied by each mode.

If a voice transmitter produces a badly modulated signal due to a misadjustment or equipment defect, the result is excessive bandwidth in the form of out-of-channel transmissions or EMISSIONS. A similar result is SPLATTER. When out-of-channel emissions and/or splatter are produced, the first step is for the operator to reduce the GAIN control setting.

This adjustment can be made during a on-the-air radio check with another station. Adjust the gain control and have the other station give you a comparative report. If you get a new microphone and wonder about the audio quality, you can ask another station for an on-the-air radio check.

While FCC rules do not specifically mandate a good connection to the earth, a ground--having such will make your receiver be able to better reject noise distractions and even static in some cases. Problems are most likely to occur during data mode operation such as RTTY or Packet.

Remember that HARMONICS are extra unwanted signals that occur at exact multiples of the desired frequency. If you are heard on 14.3 MHz when your dial reads 7.15 MHz, then you have an unwanted second harmonic. This is illegal in most cases and must be remedied immediately or the rig must be taken off the air.

34. Subelement T8 Group B

Yahoo group: NOFARSHamAcademy
Date: 2001-12-07 18:44:06 UTC
From: Billy F. Williams
Topic: 34 Message: 34

These items deal with the various types or MODES of transmissions used by Amateur Radio operators.

VOICE or PHONE is the most popular mode. On frequencies below 30 MHz (HF), the form of voice mode used usually is SINGLE SIDEBAND (SSB). SSB is preferred since it requires less spectrum space (bandwidth) than conventional AMPLITUDE MODULATION.

Single sideband can be employed using one of the two sidebands. UPPER SIDEBAND is recommended for these HF bands: 20, 17, 15, 12 and 10 meters. The upper sideband system filters out the lower sideband to accomplish bandwidth reduction.

On 40, 80 and 160 meter HF bands, the preferred voice system is LOWER SIDEBAND in which the upper sideband is eliminated by a filter.

The most basic voice mode is AMPLITUDE MODULATION. Due to the large amount of spectrum space occupied, it is seldom used. By modifying the AM signal with special circuitry, a transmitter converts AM into SSB.

For VHF and UHF bands, the preferred voice mode is FREQUENCY MODULATION (FM). It is generally used on frequency above 30 MHz. This includes 6 meters, 2 meters, 70 centimeters, etc.

So phone or voice modes include frequency modulation, amplitude modulation and single sideband.

Another more advanced technology involves the DIGITAL MODES. These are termed DATA modes. These modes are compatible with computers and allow automatic transmission. All intelligence is encoded into 1 and 0s. For example, the letter A is transmitted as 01000001. B is 01000010.

Notice the similarity between Morse Code and Data. Both use two elements in different arrangements to convey a letter. Code uses dots and dashes while data transmissions use 1s and 0s.

The slower data mode is RADIOTELETYPE (RTTY) while a more modern faster data mode is PACKET. RTTY also is referred to as FREQUENCY SHIFT KEYING (FSK).

Packet is preferred since information can be transmitted much faster. Accuracy also is much better since an error detection scheme is included. If an error is produced due to propagation anomolies, the segment containing the error will automatically be repeated until received correctly on the other end. Thus Packet includes error detection and produces much better accuracy.

The most primitive and simplest mode is CONTINUOUS WAVE (CW). Morse Code is commonly used with CW. CW occupies the smallest bandwidth. A defect called CHIRP occurs when the tone produces warbles(varies in frequency) making copyt difficult.

A defect encountered with voice modes including FM is OVERDEVIATION. The result is a distorted signal. To minimize overdeviation, a control called the GAIN should be turned down. The gain control is similar to a transmit volume control. An alternative would be to back off of the microphone and speak softer.

35. Subelement T9 Group A

Yahoo group: NOFARSHamAcademy
Date: 2001-12-10 17:00:07 UTC
From: Billy F. Williams
Topic: 35 Message: 35

Antennas are the topic of this group of items. While it is beyond the capabilities of most hams to build complex equipment similar to gear on the retail market today, antennas can be constructed cheaply and easily using copper wire, light weight metal rods and even PVC.

Commercially built antennas are expensive compared to the cost of raw materials.

The simplest antenna is the half wave DIPOLE. It is comprised of a length of copper wire or metal rod. The length is equal to the design frequency of the antenna divided into the constant number 468. For example, to cut a dipole for operation on 21.2 MHz (15 meters), the equation would be 468/21.2 with a length of about 22.1 feet. Note the answer will be in feet. The generic formula is 468/f. Dipoles are known commercially as HERTZ antennas.

Note this length is approximate. Factors such as the height above ground, the surrounding terrain, trees and nearby metal objects will cause the exact length to vary, but 468/f is a good starting point.

Cut the wire at the exact center and hook one side of the transmission line to each "half" of the cut wire or rod. An advantage of the dipole is that the antenna ground is not critical. Dipoles are generally strung horizontally between two trees or poles. A dipole only up 20 or 30 feet can bring decent results.

Another antenna option is the quarter-wave VERTICAL. One side of the transmission line is hooked to ground. As a result, the wire or rod only needs to be half as long as the dipole. The generic formula for cutting a vertical antenna is 234/f.

As the name implies, verticals (known commercially as MARCONI antennas) are mounted perpendicular or upright, usually on top of a mast pole or tower. The vertical gives equal coverage in all directions while the dipole favors only two of the four directions (those broadside to the wire).

A vertical cut for 28.450 MHz would be about 8 feet tall (234/28.45) while one for 440 MHz would measure only 6 inches or .5 feet (234/440). Note that the answer always is in FEET.

For 146 MHz, the vertical would measure about 19 inches or 1.5+ feet (234/146).

The operating frequency of an antenna is termed the RESONANT FREQUENCY. The longer the antenna, the LOWER the resonant frequency. To make a dipole originally cut for 21.2 MHz operate directly on 14.2 MHz. would require making the antenna longer. To make a 21.2 MHz antenna operate directly on 28.3 MHz would require making the length shorter.

To raise the resonant frequency of a dipole or vertical slightly higher, prune an inch or two from the end (each end in the case of a dipole).

To lower the resonant frequency slightly, add a small amount of wire or slid the metal rod out if this is possible. Old TV "rabbit ear" antennas are crude dipoles.

A dipole or vertical can be made to operate on several bands. Such antennas are MULTIBAND antennas. These use electronic components such as inductors (coils) and capacitors to

artificially modify the resonant frequency.

However, multiband antennas usually are compromise antennas and do not radiate as effectively as full length antennas. But for those living on residential lots, the advantages of the short dimensions outweigh operational aspects.

Also, the multiband antenna is more likely to radiate HARMONICS or extra unwanted signals.

Review the two basic types of antennas: DIPOLES and VERTICALS. There are many variations of these such as MULTIBAND antennas.

In the next post, we will deal with high performance antennas such as beams.

36. Subelement T9 Group B

Yahoo group: NOFARSHamAcademy
Date: 2001-12-10 20:54:49 UTC
From: Billy F. Williams
Topic: 36 Message: 36

In T9-A, we discussed two basic antennas--the DIPOLE and the VERTICAL. These are simple antennas with less directionality that we may desire.

The vertical radiates and receives equally well in all directions. It is an OMNIDIRECTIONAL antenna.

The dipole radiates and receives best in two directions. It is BIDIRECTIONAL and favors the two directions broadside to it. Remember that the dipole is usually mounted horizontally (parallel to the surface) while the vertical is mounted upright (perpendicular to the surface).

High performance antennas (called BEAM ANTENNAS or BEAMS) favor only one direction (UNIDIRECTIONAL). These respond mainly to signals coming in from the one direction in which the antenna is pointed. Likewise, a beam send outs RF energy mainly in the one direction in which it is pointed.

Most outside television antennas are beams and must pointed at the station that is desired to be viewed.

A popular beam is the YAGI. It is a basic dipole with extra elements (wires or metal tubing)added. Each dipole-like structure is called an ELEMENT. The elements are mounted on a pipe which is called the BOOM. Watch as you drive around town. Look at some outside antennas, especially TV antennas and learn to identify the elements and boom. TV antennas may have 15 or 20 elements of widely varying length. An antenna of this sort is actually called a LOG PERIODIC VEE (LPV).

You wont be asked anything about LPVs but the Yagi is similar. Although the elements vary in length, the difference is hardly noticeable from the ground.

The Yagi may be described as "two or more straight, parallel elements fixed in line with each other."

To construct a Yagi, first cut a dipole to the correct length based on the design frequency in MHz. by using 468/f. The transmission line will be attached to this dipole elment. It is termed the DRIVEN ELEMENT for this reason.

Then a second element is cut to be 5 to 10% LONGER. It is placed in line with the driven element with a spacing of a couple of feet. This longest element is called the REFLECTOR.

A third element can be cut to be 5 to 10% SHORTER than the driven element and mounted to the boom. This shorter element is called the DIRECTOR.

To make the antenna even more effective as a beam, we can add additional directors or reflectors--although most designers opt to add directors since these are shorter and weigh less. All directors should be the same length and all reflectors should be the same length.

Collectively, the directors and reflectors are called PARASITIC ELEMENTS as these are not connected to the transmission line and work through magnetic coupling due to proximity to

the driven element.

Yagis favor the direction in which the director (shortest element) is pointed.

A deluxe variation of the Yagi is the CUBICAL QUAD. The elements are square and bulky. Bamboo spreaders are usually used to keep the element wire consistent. The quad is "two or more parallel four-sided loops, each approximately one wavelength long." The amount of wire in one loop can be figured using 936/f in MHz. That is twice the length of the dipole.

An omnidirectional antenna that can made easily is the GROUND PLANE. This is a vertical with "whiskers" known as radials. Three or four quarter wavelength radials are mounted to the bottom of the antenna which otherwise is a vertical.

Verticals and ground planes are usually vertically polarized while dipoles and Yagis generally are horizontally polarized. This is due to the method of mounting. One pitfall of vertical polarization is that this method is more prone to pick up static since most noise is vertically polarized.

Antennas can be tested using the SWR BRIDGE or meter. We strive for as low as SWR as possible with a perfect installation yielding a 1:1 or 1.0:1 reading. Anything higher than 2:1 is ineffective due to excessive power being rejected by the antenna. To adjust SWR, usually the length of the main element is varied in length.

SWR can be thought of a the ratio of voltages present in the system. A good antenna has constant voltage along its length while a bad one has voltage peaks and voltage nulls (minimums).

COAXIAL CABLE is the prefreable type of transmission line in most cases. It is weatherproof. It can be buried and it is not affected by nearby metal objects. Twin-lead transmission line is affected by being wet or near other metal.

A BALUN a device mounted up at the antenna feedpoint to minimize line imbalances. While there are theoretical benefits to using a balun, many operators (myself included) believe that baluns are an additional maintenance headache and can cause more problems than they are worth.

37. Subelement T0 Group A

Yahoo group: NOFARSHamAcademy
Date: 2001-12-12 20:16:48 UTC
From: Billy F. Williams
Topic: 37 Message: 37

The final subelement in the Technician question pool deals with possible dangers and ways to mitigate the effects of electromagnetic energy on people.

When a transmitter puts out a signal, both a magnetic field and an electrostatic field are generated. These fields can adversely affect some of our vital organs.

Research still is limited in scope since it takes a decade or two to complete a meaningful study. Our awareness to RF field dangers did not increase until
the 1980s.

In 1997, FCC started requiring prospective hams to study items related to RF safety.

When using a hand-held (walkee-talkee) unit, an operator should keep the antenna away from his or her head as much as possible. Eyes are particularly sensitive to RF energy. Also, use low power when you can.

The frequencies that can produce the most problems are the VHF frequency between 30 and 300 MHz. FCC regulations are most stringent when dealing with VHF.

A microwave oven also is an RF device and is used to create heat. But the microwave oven is encased in a metal shield is isolate the harmful effects.

Heat created by an RF field can cause or aggravate eye cataracts.

The best strategy to mitigate damage due to RF fields is to INCREASE DISTANCE or separation between the source (transmitting antenna) and humans or animals. FCC regulations require that you provide a minimum amount of separation in feet based on parameters being used.

By doubling the separation, one can reduce the exposure by 75%. This is part of the principle of INVERSE SQUARE as related to distance. For example, if you move your transmitting antenna 20 feet away instead of just 10 feet, you cut the power density by a factor of 4.

This same principle can be used to minimize interference. Actually, a taller tower holding and antenna is safer than a short one. This is a good argument against tower height restrictions.

In the NEAR FIELD (areas close to the antenna)--the amount of exposure is mainly a function of the type of antena being used.

Be especially careful when dealing with MICROWAVE devices such as radar. Do not get close and look directly into a microwave feedline or antenna.

FCC mandates the amount of separation on a non-uniform basis as the human body reacts with different sensitivity to different frequencies. A chart is published so that you can make sure that your antenna is not too near a neighbor or family member.

The rate at which RF energy is absorbed by the body is called the SPECIFIC ABSORPTION RATE or SAR which is used to determine the MAXIMUM PERMISSIBLE EXPOSURE or MPE.

Keep in mind that research into long term effects of RF exposure is only preliminary. While such effects may turn out to minimal for most, it never hurts to play it safe.

38. Subelement T0 Group B

Yahoo group: NOFARSHamAcademy
Date: 2001-12-13 14:42:02 UTC
From: Billy F. Williams
Topic: 38 Message: 38

Maximum Permissible Exposure limits are NOT found in FCC Rules Part 97 (where most other rules relating to Amateur Radio are found) but instead are listed in FCC PART 1 as well as in OFFICE OF ENGINEERING & TECHNOLOGY (OET) BULLETIN 65.

When an Amateur Radio transmitter is installed at a site where other transmitters are located, all RF energy from all the transmitters at that site are collectively grouped together in measuring compliance with MPE.

An UNCONTROLLED ENVIRONMENT is an area where others are present (not including your family or household). Limits are most strict when dealing with uncontrolled environments. If you live in an apartment complex, the uncotrolled environment includes your neighbors residences. Your antenna must be located far enough away from their residences to satisfy FCC RF exposure rules.

A 30 MINUTE AVERAGE is taken of the RF energy being created by the transmitter in judging effects of RF emissions in uncontrolled environments.

A CONTROLLED ENVIRONMENT includes your residence or lot. RF energy effects are calculated using a 6 MINUTE AVERAGE in controlled environments.

Handheld transmitters are considered PORTABLE DEVICES in judging MPE compliance.

When you sign your application form for a license, you are certifying that you are familiar with RF radiation limits. All operators must review their RF radiation effects regardless of power and determine that such is within FCC rules.

This is done by making sure that the transmitting antenna is separated by a minimum distance from others. Charts are available that state the minimum distances. The distances vary with the frequency being used and are most critical when transmitters between 30 and 300 MHz are used.

Transmissions using a LOW DUTY CYCLE are least harmful. This means that the station is transmitting very little and listening a lot. FM voice is an example of a low duty cycle mode since we usually listen at least ten times as long as we transmit when averaged over a 30 minute period. This example would yield a duty cycle of only 9 or 10%.

The lower the duty cycle the better.

39. Subelement T0 Group C

Yahoo group: NOFARSHamAcademy
Date: 2001-12-13 15:11:25 UTC
From: Billy F. Williams
Topic: 39 Message: 39

This final group includes more items on RF emission exposure.

To conduct an RF exposure "survey" of your installation, you should use one of the methods spelled out in OET BULLETIN 65.

This usually involves plugging your power output, frequency used and mode (duty cycle) into a table. Make sure your transmitting antenna is located at least the specifcied distance from any places (especially public places) where a person might be located. Computer software also can be used to determine the distance separation needed. Such is available on many web sites.

When using a handheld transmitter, keep the antenna as far away from your head (and other people) as possible when transmitting, Remember that your eyes are
especially vulnerable to damage from excessive RF energy created by the transmitter.

When installing a permanent antenna, put it as far away from areas where people might be present as possible. Again, a higher tower is better since the distance is increased as you raise the antenna from the ground.

(When neighbors complain about your tall tower, you can tell them how considerate you are about their safety)

Touching an antenna can cause your skin to be burned. Such burns are called RF BURNS.

To minimize RF exposure when using a mobile system, an antenna mounted on the roof of the vehicle provides the least exposure (and also provides the best signal coverage). The metal roof acts as a shield to protect the occupants of the vehicle.

High powered RF amplifiers have metal shielding to block much of the energy. Do not turn such amplifiers on if the shielding has been removed i.e. the cabinet has been removed.

Also, the shock hazard increases if the cover/shielding has been removed. Remember that more persons have been killed by accidental contact with the common 120 volt source such as is found in homes and businesses than by any other type of power source.

40. Review of Element 2

Yahoo group: NOFARSHamAcademy
Date: 2002-01-06 14:51:34 UTC
From: Billy F. Williams
Topic: 40 Message: 40

The discussion of the ten subelements covered on the Technician exam is now complete. Use the archives feature to review past posts if you do not have these saved in your computer or printed out.

The North Florida Amateur Radio Society offers FCC testing quarterly. Exams are available at Regency Square Mall, 9501 Arlington Expressway at 7PM sharp on
the first Thursday in February, May, August and November. As of the date of this post, the next opportunity will be Thursday, February 7th.

No reservations are needed. Standard FCC exam procedures apply. Fee is $10. For those in areas outside of Northeast Florida, you should consult
testing info at www.arrl.org for details of testing in your area.

Even if you are not thoroughly familiar with the 384 items in the Technician Question Pool, it is an advanatge to take the exam. You must score 75% to pass. The questions will be identical to those in the pool. The practice of taking the test will be beneficial even if you do not pass.

Also, there are sample tests on-line where you can gain additional practice. Again, www.arrl.org is a good place to look. Or you can type "exam practice" "Technician Amateur Radio Exam" or similar phrases into a search engine to get more references.

Here are some tips on studying for the exam:

(1) Review all previous posts several times.

(2) Study all vocabulary terms that you are not thoroughly familiar with.

(3) Memorize frequency band assignments.

(4) Use note cards or "flash cards" to gain repetition advantage.

(5) Study the various modes that hams can use such as VOICE or PHONE, CW, DIGITAL, PACKET, RTTY, etc.

If you live close to Jacksonville, attend the North Florida Amateur Radio Society meetings on the 2nd Thursday of each month at Ed White High School, 1700 Old Middleburg Rd. This is near the junction of Interstate 295 and Normandy Blvd. From the I-10/I-295 junction, this exit is about one mile south on I-295.

You may find others who are studying for exams. Two or more persons studying together works out better than studying alone.

If you wish to learn this material in greater detail, get a textbook on AC/DC Electricity or Electronics. Even older editions (available for almost nothing at used book stores and even salvage shops)can be helpful in understanding the behavior of the electron.

Also, books on electronic communications can be helpful. "Electronic Communications" by Shrader is a good example.

The NOFARS Ham Academy is sponsored by the North Florida Amateur Radio Society. We may offer on-line training for the General exam if demand justifies. Such is a big undertaking and will not be offered unless interest warrants.

If you are interested in such a series, join NOFARS to show your support. Out of town members are welcome. Dues are ridiculously cheap at only $5 per calendar year. Members receive 24 e-mail and 6 printed newsletters (The Balanced Modulator) each year that keep you up to date with happenings on the local, state, national and international level. E-mail newsletters are delivered through NOFARSnet which is hosted by Yahoo.

To join, just send your name, mailing address, phone number and e-mail (if you wish to be added to NOFARSnet to receive e-mail newsletters) along with your dues to Billy Williams, N4UF; P.O. Box 9673; Jacksonville, Florida 32208-0673. Make checks payable to NOFARS.

If your membership expired with 2001, now is the time to renew since the NOFARS roster will be purged soon to include only those paid at least through 2002.

Whether we offer additional instruction for the General exam will be determined in large part by the number of members who renew and show support. Also, the number of new members gained through this series will be a determinant.

If response is weak, future plans for NOFARS Ham Academy will be slowed. There are other activities that can be accomplished using the large amount time required to offer NOFARS Ham Academy training.

NOFARS Ham Academy will be on hiatus until February while we consider the possibility of future offerings.

Now that we have all the Technician material posted, our initial goal is complete. The Academy was designed to assist those desiring entry-level training to get their ham ticket.

Through Yahoo archives, students can start at any time and study at their own pace. Spread the word about this opportunity because, again, the better the response to this initial series, the more likely that NOFARS Ham Academy will offer additional training for General and Extra license exams.

41. Study Tips for Amateur Radio FCC Exams

Yahoo group: NOFARSHamAcademy
Date: 2002-02-14 15:37:27 UTC
From: Billy F. Williams
Topic: 41 Message: 41

To pass the Technician exam one must score 74% or higher. The applicant must answer at least 26 of the 35 items correctly. Many who fail, miss the 74% mark
by only one or two questions. So every question can be important.

While the questions must be identical to those in the pool, a testing organization can change the order of the choices.What shows as answer A in the pool publication may actually be choice C on the exam.

For Amateur Radio license exams, each item will have only one correct answer and three wrong choices or distractors. If two or more choices seem correct, the testtaker is charged with choosing the "best" answer (according to the question pool authors).

When studying for an Amateur Radio exam--or any other standard exam using multiple choice format, you can improve your odds by following these tips.

(1) When you start the exam, go through the items and answer ONLY those that you are relatively sure about the correct choice. Skip those that don't look familiar.

(2) After going through the test for the first time, start again and asnwer those items that you are less familar with. If you are stumped, leave the item blank.

(3) On the third pass through the items, answer all items. There is no penalty for guessing.

(4) If you are not sure of the correct choice, eliminate the distractors that are obviously wrong. If you can throw out two choices then you have a 50% chance of getting the item correct even if you guess between the two remaining choices. If you eliminate only one obviously wrong distractor, you still have a 33% chance. Remember that many fail by only one or two items.

(5) When studying, look for key words in the correct choice. Highlight these key words in your study guide and look for them if you get the item as one of your test questions.

(6) Very few correct answer will include the words ALWAYS or NEVER. A distractor with such wording is almost sure to be the wrong choice.

(7) If you have no other idea, choose the longest answer as the correct one.

(8) VERY IMPORTANT. Once you answer a question, DO NOT go back and change your answer unless you obviously read the item wrong. For most, the first answer they think of is usually the correct one. Many more change a right answer to a wrong one than vice versa when taking a multiple choice test. I have seen many people fail electronics exams by one question. They had a passing score but failed because of a changed answer.

42. Getting on Two Meters: Step One

Yahoo group: NOFARSHamAcademy
Date: 2002-02-23 02:03:12 UTC
From: Billy F. Williams
Topic: 42 Message: 42

After receiving your entry-level Technician license, you can improve your knowledge by getting on the air. The experience and repetition of working with radio equipment will help you to advance to the second level--your General Class ticket.

Two meter FM voice is a popular mode. The two meter band extends from 144 to 148 MHz. The band is divided into sub-bands. Most operation is on repeaters although FM simplex performs well for short-range communication.

Simplex range depends on power output and antenna type and height. An effective simplex installation capable of a ten mile range on a dependable basis consists of a 25 to 50 watt transmitter output into a non-directional vertical antenna up about 30 feet.

In this post, I will discuss antenna installations--the single biggest determinant of getting good results from your system. Assuming that you can't or won't be using a big multielement array antenna, HEIGHT is a major consideration.

Telescoping masts are available for around $50 that can be installed from the ground-up using an eave mount to your roof. Each pole in the mast is about 10 feet long. A 20 foot mast has two sections that nest inside each other when telescoped in. 30, 40 and 50 foot masts also are available through some Radio Shack stores.

For better stability, it is best to leave some overlap by not extending sections out all the way. Use a 40 foot mast that is extended only 30 feet for example. Pull out each section only 7 or 8 feet instead of 10.

This need not be a high profile installation as the vertical is a simple, small antenna. Attached near the back of your house, it will be concealed enough to satisfy most restrictions.

If you put up an antenna over 30 feet or so, you will need guy wires or ropes. This makes the installation take on a higher profile though. Heavy duty nylon rope (clothes line size) works well for guys or you can buy TV antenna guy wire at most Radio Shack stores.

Even a 20 foot tall antenna can produce substantial improvement over a ground mounted assembly. If the neighborhood aesthetics police object, you can always telescope the antenna down to roof level by day and raise it at night.

If you have a small handheld radio (HT), a 20 to 30 foot antenna attached to the output jack can improve performance greatly. Count on a range of about 5 miles on simplex if you use 3 to 5 watts. On days where conditions are good, the range can increase many fold.

43. Getting on Two Meters: Part Two

Yahoo group: NOFARSHamAcademy
Date: 2002-02-23 02:33:59 UTC
From: Billy F. Williams
Topic: 43 Message: 43

Besides antenna height, the type of antenna you use can be critical if you are interested in longer distance communication.

The most basic antenna is a VERTICAL. For two meters, the single vertical element should measure 19 inches in length. Specific longer lengths can be used for slightly improved gain but the exact number of inches is critical.

Plans for simple verticals can be found on many web sites and in magazines such as QST and CQ--available on many newstands and at bookstores such as Books-A-Million, Borders, Barnes & Noble, etc. Do an Internet search on "basic ham antennas" or "two meter vertical antenna." A popular modified vertical that can be constructed cheaply is a J POLE. Demos are given from time to time at NOFARS meetings on constructing simple antennas.

The basic vertical requires a good ground to be effective. You should connect the shield of the transmission line and the metal antenna frame (mount) to a ground rod driven into the dirt at least 4 or 5 feet. This may be done by connecting the metal supporting mast to the ground rod that has been placed nearby. If you live on sandy soil, you may need to dig the ground rod in deeper. If grounding is a problem, use the GROUND PLANE which does not require an RF ground.

A GROUND PLANE is another type of modified vertical. Besides the single vertical rod or elment, the ground plane has three or four elements of similar length that extend at a 90 degree angle (horizontally) from the vertical elment feedpoint. A ground plane is slightly more effective than a basic vertical although it requires a total of 4 or 5 elements instead of just one.

For reliable coverage of 25 miles or more, a beam antenna is a good investment. An alternative would be to increase antenna height up to 60 or 70 feet and use a basic vertical antenna.

The purchase of a beam usually requires purchase of an antenna rotor. Smaller two meter beams can be turned with a small TV antenna rotor. Beams can be constructed from using light-weight, thin-walled aluminum tubing. The elements can be attached to a boom made out of metal tubing or even PVC pipe by using U-bolts. Or the elements can be stuck through holes burned into the PVC boom using a soldering gun. Use super glue or epoxy filler (Bondo) to hold the elements in place.

The W4IZ Field Day is a great place to see antennas and construction techniques up close. Plan now to attend the next one. Great experience can be gained by helping with antenna installation on Friday afternoon. Watch the NOFARS Balanced Modulator newsletter for info on the next Field Day. The event is held on the fourth full weekend in June of each year.

Along with your antenna, you will need transmission line. The handiest is coaxial cable. For best results, use cable with am impedance (Z) of 50 to 52 ohms. A common stock number is RG-58U.

Cable TV type coax is easily mistaken and looks very similar but has a stock number such as RG-59U. Cable TV coaxial cable has an impedance rating of 72 ohms which will diminish effectiveness of an installation slightly. But it will work adequately with most ham antennas. If it is avialable free and you have to buy RG-58U, try it.

Use good coaxial cable connectors especially for outdoor installation. Male connectors normally use a stock number of PL-259. The female version is SO-239. A "reducer" is handy when working with RG-58 but can be omitted if more care is taken when soldering the connector to the cable.

If you can buy cable with connectors molded onto each end--and get it through the hole in your house wall--do it. Such is available at some outlets in 50 or 100 foot lengths. You also can buy cable with molded connectors, cut the cable, pass it through the hole and then splice it back together. Splicing cable generally is better than installing connectors unless you have soldering experience.

Black electrical tape is handy for covering splices. It also can be used to secure the cable run to the mast. Or tie-wraps can be used to secure the cable run.

Coat the antenna connection point after you have hooked up the connector with sealer such as RTV. The sealer should be flexible so that it can be peeled away with a pocket knife later.

44. Getting on Two Meters--Part Three

Yahoo group: NOFARSHamAcademy
Date: 2002-03-18 15:32:05 UTC
From: Billy F. Williams
Topic: 44 Message: 44

For maximum safety and effectiveness, your equipment should be grounded. By connecting your gear to the earth's surface--interference, lightning and other detriments can be minimized.

Ground can be thought of as a big garbage dump. Due to its large size, the earth neutralizes electrical charges. An ungrounded system can be viewed as a room with many people that is not equipped with a garbage can.

One of the three wires from your AC wall outlet is a ground. It is usually color coded GREEN. Theoretically, this wire is connected to the surface of the earth through your breaker box and a copper rod driven into the ground. But the best ground connection uses as short of a wire as possible. Due to the electrical resistance of wire, a GROUND LOOP can be formed if the wire is too long or thin.

This ground loop can cause hum in your signal and excessive static on your receiver.

To ground your equipment, drive another copper ground rod at least 6 feet into the earth right outside the hole where your coax emerges from your house. These rods can be purchased at most large hardware stores.

Next, connect a wire to the top of the ground rod and route it into your station area along with your transmission line(s). The thicker the ground wire, the better. It is advisable to use a flexible wire.

A good practice is to strip the center wire out of a length of unused coax cable, flatten out the remaining sheild and use that coax shield as the ground wire.

Then, connect the metal frames (chassis) of all your equipment items to this ground wire. Most equipment has a thumbscrew or connection that allows the ground wire to be attached easily.

Each item in your station can be connected directly to the ground wire or the items can be daisy-chained by just connecting all metal chassis together and running one jumper from the nearest item to the ground wire.

Your antenna mast also should be connected to the ground rod.

45. Getting on Two Meters: Part Four

Yahoo group: NOFARSHamAcademy
Date: 2002-02-23 03:15:47 UTC
From: Billy F. Williams
Topic: 45 Message: 45

Once you get your antenna installed, it is time to test it out. Ideally, you will have a STANDING WAVE RATIO (SWR) METER. It should be rated for use up to at least 150 MHz. In a pinch, an SWR meter rated only for High Frequency (HF) use (up to 30 MHz) can be used but accuracy is lower.

Indirectly, the SWR meter tells you what percentage of your power output is being converted into RF energy (a radio signal)and radiated. Of course, your goal is 100%. This translates into an SWR reading of 1:1 (One to One).

An SWR reading of 1.5:1 means that 96% of your power is being radiated and 4% is being rejected and being turned into heat. A reading of 1.5:1 or less is acceptable in most cases.

An SWR reading of 2:1 means that 89% of your power is being radiated and 11% is being rejected. This is marginal and attempts should be made to improve the match by changing the dimensions of the antenna slightly or adjusting a matching network that comes with many commnercial antennas. See the instruction manual for the exact procedure.

If your SWR approaches 3:1, then you probably have a bad connector or coax cable. Look these over carefully. Also, check your ground path especially if using a simple vertical. 75% of your energy is being radiated but heat from the 25% reflected power probably will damage the output section of your radio. Most modern gear has an automatic shutdown or foldback circuit that reduces your power output before damage can occur. But the result is still very poor communications.

It is a good idea to first test your SWR before installing the antenna at full height. Just get the antenna away from other metal as much as possible. You might temporarily attach the antenna to a wooden stepladder for example or just stick a short pipe--a fence post for example--in the ground and mount the antenna. For best results, measure the SWR at the antenna feed point for initial testing.

The SWR reading will change slightly depending on the exact frequency between 144 and 148 MHz being used. For tuning purposes, transmit into the antenna on 146.00 MHz or so. Find a clear frequency and give your callsign. Hold the microphone press-to-talk button down and note the reading.

Once, you have an SWR or 1.5:1 or less near ground level, it is time to raise the antenna up to full height. The SWR may change slightly as you raise the antenna. In many cases SWR will go down as you get the antenna farther away from big metal structures.

The SWR meter should now be taken inside and connected to the transceiver RF output jack. Connect the SWR output to your transmission line (coax). Make sure the SWR reading is still acceptable.

You can now secure your cable and patch the hole in your wall or floor--if you have crawlspace under your floor. Caulking compound works good and is easy to remove if you have to change cable later or run additional cables.

Many hams have multiple antennas for two meters. The best combination is a VERTICAL and a BEAM array. By using an antenna switch, you can switch back and forth quickly to choose the best for a particular contact. Two-position switches with SO-239 connectors are available at Radio Shack.

Use the vertical for general listening since it picks up equally well from all directions. When you establish contact, switch to the BEAM and use the rotor to peak the signal that you are receiving.

For local repeater work, use the vertical. Also, reduce your power. When using repeaters such as the W4IZ system, lower power can be more effective when you are close to town. High power tends to confuse the repeater "voting system" that is used to handle feeds from remote receivers that allow W4IZ to cover more territory. Most transceivers have a low, medium and high power option. Medium is a good setting to use for repeater work unless copy gets rough.

46. Getting on Two Meters: Part Five

Yahoo group: NOFARSHamAcademy
Date: 2002-02-23 03:46:53 UTC
From: Billy F. Williams
Topic: 46 Message: 46

The next step is to make a contact. NOFARS offers a certificate to members in commemoration of their first contact as a ham. Just send contact information (date, time, frequency, call and name) to n4uf@... and you will receive your certificate at the next meeting. Certificates cannot be mailed but
you can have a friend who attends the meeting pick up your certificate if you can't make it.

The NOFARS-sponsored repeater system is W4IZ. It transmits signals on 146.700 MHz VHF and also on 444.400 MHz UHF. To use the VHF repeater, you send a signal to it using 146.100 MHz. and listen to the repeater on 146.700 MHz. This is termed NEGATIVE OFFSET (-).

On UHF, the user transmits on 449.400 MHz (POSITIVE OFFSET) and listens on 444.400 MHz. A CTCSS tone is required. The tone is 127.3 Hertz and must be programmed into the transceiver. Se your manual for the exact proceudres. It vaires widely depending on the type of equilment Although W4IZ was established as an independent project by a core group of NOFARS supporters, the hardware is made available for use by NOFARS members by its owners. No NOFARS funds have been used for system hardware. The system has been funded by donations. But donations are not necessary to use the system. This arrangement has helped us keep NOFARS dues affordable for everyone at only $5 per calendar year.

Another NOFARS membership benefit is the Balanced Modulator newsletter. It is sent free to all members every other month. The printed Balanced Modulator periodically contains codes that you can use to make the repeater more useful to you. An example is the autopatch which allows you to tie into the telephone system and make local calls. It is a good idea to save your Balanced Modulator issues in a file folder for future reference.

The e-mail Balanced Modulator is published twice each month. At present, over 250 NOFARS members subscribe. Once you are a member, send a short e-mail to n4uf@... and you will be added to the list.

A third source of information is the Balanced Modulator Online. It contains abbreviated articles and is updated as events warrant. To view it, access
http://home.earthlink.net/~bfwillia/_wsn/page4.html

W4IZ also is the official repeater system for the Crown Amateur Radio Emergency Service (ARES). Crown ARES covers seven counties in Northeast Florida. See the Crown ARES plan posted on the NOFARS First Coast Community Website
http://groups.firstcoastcommunity.com/211 for details. NOFARS is the lead club for Crown ARES. During the recent Putnam County train wreck, the W4IZ Repeater System provided a link between Jacksonville hospitals and Red Cross HQ to relief shelters near the derailment site.

To secure a contact, call a friend on the telephone first and ask him or her to get on W4IZ. Or if the repeater system is not busy, just key the microphone and say "(call sign) listening" It is a good idea to key your microphone about two seconds before you start speaking on W4IZ in order to allow the various remote receivers in the system to activate. If you get no response, wait ten minutes or so and try again.

Also, you can break in to a conversation and ask for a signal report. Wait for a pause and simply announce your call sign. Ask the station to listen to you on the repeater input if possible.

Attend monthly NOFARS meetings when you can. You will learn names and calls of W4IZ operators who can assist you. Peak hours on W4IZ are 7 to 9 AM and 4 to 6 PM when mobiles are most likely to be on the road. The main purpose of a repeater during non-emergency times is to extend the range of lower powered mobiles and handheld operators. Base stations should use simplex during peak hours when communicating with each other.

During off-peak times, repeater activity can be sparse so be persistent in your calls. Try every ten minutes or so.

After you make contact using W4IZ--keep your transmissions short. Long monologs are frowned upon since diatribes might cover up a mobile with an emergency. A good policy is to keep each transmission to a minute or less.

If you are speaking with several stations (in a roundtable)--make sure that every operator gets a chance to speak. You should announce your call near the start of your first transmission. Then you have up to ten minutes in which to identify again.

You do not have to come on the air just to identify. If you start a transmission and it has been close to ten minutes since your last ID, give your call when you start that transmission. If you speak for one minute and then listen for nine minutes, you DO NOT have to key up just to ID. Just announce your call when your turn in the roundtable occurs.

47. Multimeter Voltage Readings

Yahoo group: NOFARSHamAcademy
Date: 2002-03-31 13:02:12 UTC
From: Billy F. Williams
Topic: 47 Message: 47

A multimeter is used to measure the amount of voltage, current or resistance in a component or circuit. It is the most basic piece of test equipment.

Multimeters are available in a DIGITAL or ANALOG format. The analog multimeter is seldom used since the digital meter is easier to use and interpret.

The biggest difference between a cheap digital meter costing $20 or so and an expensive one in a $100 to $300 price range is the quality of the plastic case.

Dropping a cheap meter may mean replacing it while a meter with a shockproof case can withstand heaps of abuse. Technicians who use a meter often should buy one with a heavy duty case.

To read voltage using a multimeter--you must first select AC or DC. AC is produced by most generators. Wall plug voltage is AC. If you attempt to read the wall plug voltage using DC settings, you will either get a zero reading or an erroneous one.

Batteries produce DC. When checking a battery, select DC instead of AC. Most batteries are nominally 1.2 volts, 1.5 volts, 6 volts or 12.6 volts. It is best to test batteries while they are powering a circuit. This is termed testing UNDER LOAD. If a battery is less than 80% of its nominal (labeled) value, it should be replaced. Some applications require at least 90% of nominal voltage to function correctly.

If a battery is tested while disconnected from its circuit, this is a NO LOAD test. Often batteries, espceially auto batteries, will check out at nominal voltage without a load but drop 40 or 50% when put under load. No load tests are not as reliable as tests made under load.

If you suspect that your AC wall plug voltage is low, that may be tested by touching one meter lead to each of the two parallel contacts. Be sure not to touch any metal with your skin.

The nominal value of wall plug AC is 120 volts. A reading between 115 and 125 volts is usually acceptable.

Power supplies are used to convert the 120 volts AC from the wall plug to a different voltage--usually 12.6 volts. To check the output from a power supply, use the DC voltage setting.

Some basic troubleshooting may be accomplished by taking voltage readings and comparing these with normal readings provided by service literature. If a voltage reading is off by over 10%, the problem is probably near that test point. Unfortunately, it is hard to get good service literature for most equipment that is not industrial grade.

Polarity is a factor when using DC analog multimeters. The red lead is positive(+) and the black lead is negative (-). If polarity is reversed, the meter needle will deflect backwards and possibly damage the mechanism.

With digital multimeters, the reading will correct when polarity is reversed but will show as a negative number on the readout.

Polarity is not a factor when reading AC voltage.

48. Multimeter Resistance Readings for Wire, Fuses, Switches, Bulbs

Yahoo group: NOFARSHamAcademy
Date: 2002-05-24 19:38:58 UTC
From: Billy F. Williams
Topic: 48 Message: 48

A multimeter also may be used to check resistance. When reading resistance, always do so without ANY power being applied to the component or to the circuit under test. Unplug or disconnect the wall plug or battery.

Making a resistance test on an energized circuit probably will damage your meter.

Resistance is measured in OHMS. ZERO (0) ohms means no resistance. This means that current (I) flows without any obstruction through the wire or other metal based material and that the path for electron flow is complete.

Zero ohms is only a theoretical concept. All material has some resistance even though resistance to current flow may be only a fraction of an ohm. For practicality, we say LOW ohms instead of zero ohms. Low ohms (ohmage) in most cases means 200 ohms or less.

The longer that a piece of wire is, the more its resistance will be. Wire is generally rated in the number of ohms per hundred feet. If the rating is 2 ohms per hundred feet and we use 500 feet of wire, the resistance will measure about 10 ohms (5.00 hundred x 2 ohms)

That wire may be a straight piece or the wire may be coiled up into a small space. Either way, a low resistance reading means that the wire is not broken. We say that the wire has CONTINUITY and is a good conductor of electrons.

One can use a resistance test to check a regular light bulb or fuse. If the wire (called a filament) is unbroken, the bulb or fuse works. A reading of low ohms means good.

However, if the filament wire is broken, the path is interrupted and no current moves through the fuse or bulb. This will cause an ohm meter reading of INFINITY.

An infinity reading means that there are hundreds of millions of ohms of resistance and that no current can move due to the overwhelming resistance.

A switch can be tested with an ohmmeter. In the ON position the meter should indicate low ohms when the two probes are attached to the two switch terminals. With the switch thrown to the OFF position, the reading will be infinity. You should see the resistance change as you turn the switch on and off. Again, the switch must be removed from the circuit for resistance testing.

More complex switches have 3 or more terminals. These also can be tested but focus on simple (two terminal) switches at this point.

And resistors may be tested. The color code tells the nominal resistance. The actual value may vary 10 per cent or more. A good rule of thumb is that messured resistance should be within 10 per cent of the nominal (color-coded) value. A 100 ohm resistor should test between 90 and 110 ohms. Tests must be made with the resistor removed from the circuit.

Consult any basic electronics handbook for more on how to apply the color code.

0=Black 1=Brown 2=Red 3=Orange 4=Yellow 5=Green 6=Blue 7=Purple 8=Gray 9=White

The first three or four bands (usually three) indicate the resistance in ohms while the next band (usually fourth) indicates the allowable error or tolerance in percent. Gold means plus or minus 5% tolerance and Silver means +/- 10% variation is permissible.

When reading the resistance bands (usually the first three stripes starting with the stripe closest to the edge), the first two colors translate directly into digits. The third band denotes the NUMBER OF ZEROES that are attached to the two digit number indicated by the first two bands.

For example, GREEN RED ORANGE means 5 2 000. The orange third band indicates three zeroes (or thousands). If the fourth band were silver, then we would accept any meter reading between 52000- 5200 and 52000+5200. The allowable range would be 46,800 and 57,200 ohms. If outside of that range, the resistor is BAD. We could also describe the range as 46.8K Ohms to 57.2K Ohms. The prefix K indicates THOUSANDS.

52. FREE Downloads: CW Trainer & Practice Computer Program & Portable Antenna Plans

Yahoo group: NOFARSHamAcademy
Date: 2003-03-08 18:48:03 UTC
From: Billy F. Williams Jr
Topic: 52 Message: 52

Reviewed by Sandor Wetsel, KG4FET

Are you looking for the ultimate Morse Code training tool for your computer? Is the fact that having to use a keyboard to learn CW "bugging" you to no end?

Are you an old pro and just want to practice CW but the rig is at home and your on the road with the Lap Top? Then G4FON's Koch Method CW Trainer is just what you need!

For the person just starting out learning CW, you can add a letter at a time starting with 2 and going from there. Character speed, word speed, and effective speed are all adjustable. For the old pro and the newbie both you can add QSB at varying levels, change the background noise level from 0 to "S9," and change the signal strength as well. The best part of all is that you can write it on paper just as you would at home. Double checking your work against the screen when your done. Other nice features of the software include, adjustable pitch, and display delay (time that characters appear on the screen after being sent),and starting delay, this allows you to change how quickly characters are sent after clicking Start, and last BUT NOT least the ability to add key clicks that you will hear very often on the air. This free download is available via G4FON www.qsl.net/g4fon

Other items on Ray's site include a loop antenna (v.1 and 2), a QRP watt meter, Ray's personal "musings" on the "Miracle Whip" a QRP all band very portable antenna, and his QSO diary. If you do download the software or use the designs on the site let Ray know how you faired on them. Also if you are a programmer and wish to adapt or modify the Koch Trainer, email Ray G4FON and he will send the C++ source codes to you.

With Great tools like this one out there, there is NO REASON not to upgrade and enter into the fascinating world of HF operating, antennas, and DX'ing the world over. Whether it is with a top of the line "contesting" rig like the Yaesu FT 1000 series of rigs and 1500 watts, or at QRPp levels (100-500mW) on a home-brewed rig no bigger then a cigarette pack and portable wire antenna where the whole station, rig, tuner, watt meter, batteries, and antenna will fit in a typical "lunch bag."

Good Luck to you all, God Bless, and 73
DE KG4FET Sandor

53. New Question Pool Effective July 1, 2003

Yahoo group: NOFARSHamAcademy
Date: 2003-05-11 16:58:26 UTC
From: Billy F. Williams Jr
Topic: 53 Message: 53

The Technician Question Pool has been revised and will take effect on July 1st. New topics and questions have been added.

NOFARS Ham Academy posts covering the 2000 Technician Question Pool are archived. These can be viewed by accessing the NOFARS Ham Academy web site.
http://groups.yahoo.com/group/NOFARSHamAcademy/messages

Click on PREVIOUS to see more posts. The site also can be accessed from the main NOFARS site www.nofars.org Click on BALANCED MODULATOR and scroll down to the article GETTING STARTED IN AMATEUR RADIO. A link is contained in the article.

Questions on items in the pool are welcome. Send these via e-mail to n4uf@...

If possible, take the exam before July 1st. If not, new study guides should be available in June. Updates will be posted here and e-mailed to subscribers later this summer.

54. Improving CW Speed

Yahoo group: NOFARSHamAcademy
Date: 2003-06-13 22:19:57 UTC
From: Billy F. Williams Jr
Topic: 54 Message: 54

While Morse Code testing is not required for the entry-level Technician exam, many elect to upgrade to General Class. The former 13 word-per-minute speed used for testing has been reduced to five words-per-minute. A "word" is considered to be five characters (letters). Punctuation marks and numbers count as two characters.

One can pass by being able to answer seven out of ten items on the written exam given immediately after the code is sent. The message is similar to what one might hear during an initial CW contact. Items such as the senders location, name, type of equipment, signal report, occupation, etc. may be on the exam.

One can improve his or her odds of passing the code test by becoming familiar with this format. It is not necessary to copy the message solidly. It is important to copy the critical parts of the message that will be on the test. These items fall into moderattely predictable patterns. Future posts will contasin info about the format. Sites are available online that offer free sample CW exams. Software also is available for most computyers that can compose an infinite number of practice exams to gain repetitive practice.

Another way to pass is to copy 25 consecutive characters. No written code test is required if this can be done.

Practice sites change from time to time so I will not put out any specific ones. However, a search on www.google.com or other search engine using keywords such as "practice code tests" "Amateur Radio" license, etc. will yield results.

Jim, AD6WL via eHam.net has posted the following about a Yahoo CW group and also frequencies to operate if you already have a General license. Those who have not yet passed their CW exam but who own a receiver also may benefit by monitoring these frequencies. Here are his comments.

Many new hams want to operate CW but often find the speeds they hear on the air to be very intimidating. You can listen to the ARRL CW practice on the air but that gets boring after a while.

There is another option. There is a Yahoo group devoted to QRS (slow speed) CW. This is a great opportunity for new hams to get together with other hams who operate at the same speed and for some of you experienced CW ops to share information with the group and QRS to make contacts with these new hams.

I have found the best way to enjoy CW was to make contacts with other hams. After operating QRS for a while you will notice that your speed

will start to increase.

The website for the group is: http://groups.yahoo.com/group/QRS-CW/

Here is a list of the unofficial slow-speed CW operating frequencies. These frequencies are only a guideline as a place for the group to meet and are not part of any band plan. If you hear a slow speed CQ out there, answer the call and enjoy a relaxed QSO at a slower speed.
1.850 3.700 7.124
7.050 10.125
14.050 21.150 21.125
24.8915 28.160

Most QRS activity seems to be on 7.050 & 14.050. Thanks to Jim for these tips.

Another option (propagation permitting) is the All Florida Slow Speed CW Trafic Net (QFNS) which meets daily at 8PM Eastern time on 3.715 MHz. One can hear the basic procedures used by nets and improve code proficiency simultaneously. A new General licensee also can check in and perform valuable service. The net operators will gladly slow down for you upon request.

For the ARRL W1AW practice schedule consult http://www.arrl.org or the May-June NOFARS Balanced Modulator.

55. Online Practice Written Tests

Yahoo group: NOFARSHamAcademy
Date: 2003-07-06 19:16:28 UTC
From: Billy F. Williams Jr
Topic: 55 Message: 55

At least two sources of FREE online practice written exams are available via Internet. These allow you to gain knowledge by repetition. You can keep track of your progress as you study.

Try these sites for practice exams

http://www.aa9pw.com/radio/

http://www.hamquick.com

56. Web Sites

Yahoo group: NOFARSHamAcademy
Date: 2003-09-02 22:12:13 UTC
From: Billy F. Williams Jr
Topic: 56 Message: 56

A good way to learn more about Amateur Radio is to access web sites. While some material may be too advanced for some to follow, information gleaned can make it easier to pass written exams.

The URL is http://www.nofars.org By following the links at the bottom of the main page, one can access pages on the W4IZ Repeater System, Skywarn, Florida HF and VHF nets, FCC Testing, the upcoming Jacksonville FREE Hamfest and meeting/event dates.

The Balanced Modulator Online newsletter also can be viewed. Check it every week or two for updates.

Those who are interested in the Amateur Radio Emergency Service should access http://www.ares.org and the Duval ARES site http://www.duvalares.net

57. Updated Technician Study Guide--Element 2

Yahoo group: NOFARSHamAcademy
Date: 2003-12-15 13:46:55 UTC
From: Billy F. Williams Jr
Topic: 57 Message: 57

This updated Technician written exam study guide is courtesy of Bruce Spratling, W8BBS. It will be sent and posted in several segments.

Here is the introduction and question breakdown. Explanatory material will be sent in later posts.

Introduction
The Federal Communications Commission (FCC) makes and enforces the rules for amateur radio (the amateur service) in the United States. Two reasons for amateur radio in the US are to increase the number of trained radio operators and electronics experts, and improve international goodwill. The FCC must grant you an amateur operator/primary station license before you can operate an amateur station in the US (or where ever the FCC is in charge). The FCC may inspect your station at any time.

The amateur operator licenses are: Technician, Technician with Morse code, General, and Amateur Extra.

A Volunteer Examiner (VE) is an accredited amateur who volunteers to administer amateur license exams.
There are 4 examination elements.
For a Technician amateur license, you must pass a single 35 question multiple-choice written exam, Element 2.

Anyone except a representative of a foreign government can become an amateur licensee in the US, and there are no age limits.
The questions on the Element 2 exam are taken from a pool of 507 questions. A score of 26 is passing.

When you are given your element 2 exam, you'll receive 2 pages of graphics. You MUST have a copy of the graphics to use this study guide. The graphics are available at WWW.ARRL.ORG. These graphics are used in some of the questions. There is information in the graphics that can be useful for other parts of the test. In this study guide I ask you to write things on your copy of the graphics. This will help you remember. You can't bring any books to the exam, but you can bring a calculator.

After you pass element 2, you may transmit as soon as the FCC grants you a license and the data appears in the FCC's ULS database (available on-line). Licenses are good for 10 years. You may renew your license no more than 90 days before it expires. If your license expires, you may NOT continue to transmit, however you'll have a 2 year "grace period" in which to renew. A Technician class license is the only FCC certification required for amateur radio operators to build or modify their own transmitting equipment.

FCC Part 97 contains a detailed list of your operating privileges.

To upgrade your license from technician to technician with Morse code, you'll need to pass the 5 word-per-minute Morse code exam, element 1. A deaf person can take this test using a flashing light or vibrating surface. When you pass the element 1 exam you'll receive a Certificate of Successful Completion of Examination proving that you passed, and that you are authorized to use certain amateur frequencies. This credit can be used for license upgrade purposes for 365 days.

The Table of Contents tells you how much time you should need for each section, and the questions from the question pool that are covered. Each question on the exam has a number, such as T1A16. All questions on the technician test begin with the letter T. Next is a digit, 0-9. The test has 10 sections, numbered 9 thru 0. Next is a letter. Each section of the test has between 2 and 6 questions, A,B,C . Next comes a 2 digit number. Each question on the test is taken from a separate pool of between 10 and 22 questions. For example, the question pool has 16 questions whose numbers are T1A01 thru T1A16. Each test will have 1 question from this 16 question pool, a question that begins with T1A.

You'll pass the exam if you learn enough to answer half the questions, and eliminate half the choices on the other questions. If one of the choices on a question is "All of these ", that will be the correct answer 62% of the time.
The technical material is covered in the first half of this study guide. The second half is easier, so don't get discouraged!

Some of the topics in this study guide have been over-simplified to make it easy for you to pass the test.
Please send comments to: W8BBS@....

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58. W8BBS Study Guide Part 2: Basic Electronics

Yahoo group: NOFARSHamAcademy
Date: 2003-12-15 13:51:57 UTC
From: Billy F. Williams Jr
Topic: 58 Message: 58

BASIC ELECTRONICS

I. Electricity

A current is a flow of electrons in an electric circuit. Currents flow through electrical conductors such as gold, silver, and aluminum.

The basic unit of electric current is the ampere. Current is measured using an ammeter.

An ammeter is connected in series with a circuit under test (so all the current flows through it).

A direct current (DC) is a current that flows in one direction only.

An alternating current (AC) current flows back and forth, first in one direction, then in the opposite direction.

To have a current, there must be an electromotive force to move the electrons.

The basic unit of electromotive force, or electric potential, is the volt (V). Voltage is measured with a voltmeter.

A voltmeter is connected in parallel with a circuit under test. An automobile battery supplies about 12 volts.

Resistance limits the current that flows through a circuit for a particular applied DC Voltage.

The basic unit of resistance is the ohm, measured with an ohmmeter.

If two resistors are connected in series, their total resistance is the sum of the two resistor values.

The watt is the basic unit of electrical power. The power in a circuit is equal to the resistance times the current squared.

Figure T8-9: Label meter B "current". Label meter A "voltage". Write "Power = R X B squared".

A Multimeter is a meter that combines an ohmmeter, an ammeter, and a voltmeter. It's used to measure voltage, current and resistance. Measuring voltage when using the ohms setting might damage a multimeter that uses a moving-needle meter.

When you switch a voltmeter from a lower to a higher voltage range, inside the voltmeter resistance is added in series with the meter.

Ohm's Law is a formula that shows how voltage, current and resistance are related in an electric circuit.

E = I X R, where E = electromotive force in volts, I = current in amperes, and R = resistance in ohms.

To answer the Ohm's Law problems, just try all the answers in the formula until you find the one that works.

A Capacitor is two sets of conducting plates facing each other separated by an insulator (a non-conducting material). In a variable capacitor, the plates can be moved, changing the surface area where the plates face each other.

A capacitor blocks the flow of direct current while allowing alternating current to pass. A capacitor stores electrostatic voltage (and keeps the voltage constant).

A high voltage capacitor can give you a shock from a residual stored charge even if it's not in an energized circuit.

The basic unit of capacitance is the farad. If two capacitors are connected in parallel, their total capacitance is the sum of the two capacitors.

An Inductor (a wire coil) stores current electromagnetically (keeps the current constant). The basic unit of inductance is the henry.

II. Metric system prefixes & decibels

Kilo = thousand, Mega = million, Giga = billion. Milli = thousandth, micro = millionth, pico = millionth of a millionth.

If a hand-held transceiver has an output of 500 milliwatts, this is .5 watts.

If an ammeter marked in amperes is used to measure a 3000-milliampere current, it would show 3 amperes.

One microfarad is 1,000,000 picofarads.

To say something represents a 3 decibel (dB) increase means it doubled.

If you increase your transmitter output power from 5 watts to 10 watts that's a 3 dB increase.

III. Fuses

A short circuit draws high current, which blows a fuse, which creates an open circuit. If you replace a transceiver's 5 amp fuse with a 30 amp fuse, the transceiver could use more than 5 amps (without blowing the fuse) and cause a fire.

When fuses are installed in 12-volt DC wiring, they should be placed at the voltage source. Fuses are always installed in series.
Home built equipment powered from 110 volt AC lines should always

have a fuse or circuit breaker in series with the equipment.

IV. Other components

PNP transistors use low voltage, whereas vacuum tubes use high voltage.

A diode controls current to flow in one direction only.

ICs (integrated circuits) combine several functions into one package.

A signal generator produces a stable, low-level signal that can be set to a desired frequency.

A rectifier changes an alternating current signal into a varying direct current signal.

Figure T7-1: Label symbol 3 "fixed resistor", symbol 2 "variable resistor", symbol 1 `fixed capacitor ', symbol 4 "NPN transistor", symbol 6 "iron-core inductor", symbol 7 "antenna", symbol 13 "single-cell battery".

Figure T7-2: Label symbol 3 "double-pole, single-throw". Label symbol 4 "single-pole, double-throw".

59. W8BBS Study Guide Part 3: Radio Waves, Propagation, Bands

Yahoo group: NOFARSHamAcademy
Date: 2003-12-21 02:14:52 UTC
From: Billy Williams
Topic: 59 Message: 59

RADIO WAVES

I. Frequency / Wavelength

The number of times per second that an alternating current (AC) flows back and forth is the frequency. The standard unit of frequency is the hertz (Hz). 60 hertz (Hz) means 60 cycles per second.

There are 1000 hertz in a kilohertz (kHz), and 1,000,000 hertz in a megahertz (MHz).

If a radio wave makes 3,725,000 cycles in one second, this means its frequency is 3725 kilohertz, or 3.725 megahertz (MHz).

Radio waves are waves of electric and magnetic energy that travel through space at the speed of light, about 300 million meters per second. The distance a signal travels during one complete cycle is a wavelength.

The speed of a wave is equal to its wavelength times its frequency. If we measure a radio wave?s frequency in megahertz (MHz), and its wavelength in meters,

wavelength X frequency = 300

Using this formula, we can determine the wavelength if we know the frequency, or the frequency if we know the wavelength.

To find the frequency, divide the wavelength into 300. The frequency of a 6 meter wave is 300 / 6 = 50 MHz.

To find the wavelength, divide the frequency into 300. The wavelength of a 223 MHz signal is 300 / 223 = 1.35 meters.

Note that as a signal's frequency increases, its wavelength gets shorter.

Frequencies from 20 Hz to 20,000 Hz are called audio frequencies because the human ear can sense sounds in this range.

Frequencies more than 20 kHz are radio frequency waves (RF).

Sometimes RF waves are considered to be frequencies between 3 kHz and 300 GHz (giga-hertz).

Electrical energy at a frequency of 7125 kHz is in the radio frequency (RF) range.

Radio waves are classified as HF, VHF, or UHF according to their wavelength and frequency.

II. Modulation, bandwidth, and emission types

The basic principle of radio communications is: a radio wave (an RF carrier) is combined with an information signal and is transmitted; a receiver separates the two.

The information signal can be analog, which means continuous, or digital, which means it occurs in specific steps.

Modulation is the process of combining an information signal with a radio signal.

Modulation causes the radio signal to be spread over a range of frequencies. This range is the bandwidth.

There are many different types of modulation:
CW (continuous wave)- Morse code. CW is transmitted by on/off keying an RF signal to form dots and dashes. Bandwidth is about 100 Hz.

RTTY (radioteletype)- a digital mode, the RF carrier is modulated using a modem. Bandwidth is about 300 Hz.

SSB (single sideband)- When an RF carrier is modulated by an audio signal, it occupies a bandwidth. Most of this bandwidth is removed, so you only transmit one sideband of the signal (usually the upper sideband). Bandwidth is 2 to 3 kHz.

FM (frequency-modulation)- an analog mode. FM voice is good because it has less static than AM. Bandwidth is between 10 and 20 kHz.

Phase modulation is similar to FM. Like FM, it?s produced using a reactance modulator.

Amateur fast-scan television- A cable ready TV receiver will allow you to monitor Amateur Television (ATV). Bandwidth is about 6 MHz.

SSB and CW are considered to be weak-signal modes and have the greatest potential for DX (long distant) contacts.

The best emission mode for two-way EME (earth-moon-earth) contacts is CW.

The FCC calls voice emissions phone. It has nothing to do with telephones. "Phone transmissions" usually means AM, FM or SSB voice.

The FCC calls telemetry, telecommand or computer communications emissions Data.

You need a computer to conduct Amateur Radio communications using a data emission.

III. Technician with Code HF Operating Privileges

Band Frequency
HF 80 meter 3.675 MHz to 3.725 MHz CW Only
HF 40 meter 7.1 MHz to 7.15 MHz CW Only
15 meter 21.1 to 21.2 MHz CW only
HF 10 meter 28.1 MHz to 28.3 MHz CW only

HF 10 Meter 28.3 MHz to 28.5 MHz CW, SSB phone

Technician VHF Operating Privileges

VHF 6 meter 50 MHz to 54 MHz
VHF 2 meter 144 MHz to 148 MHz
VHF ?special band? 219 MHz to 220 MHz Digital message forwarding only
VHF 1.25 meter 222 MHz to 225 MHz

Technician UHF Operating Privileges

UHF 70 centimeters 420 MHz to 450 MHz
UHF 70 centimeters 430 MHz to 450 MHz Frequency limits north of line A
UHF 33 centimeters 902 MHz to 928 MHz All modes are allowed
UHF 23 centimeters 1240 MHz to 1300 MHz All are allowed 60 MHz
UHF 13 centimeters 2300 MHz to 2310 MHz All are allowed
UHF 13 centimeters 2390 MHz to 2450 MHz All are allowed 70 MHz

Emission type Bandwidth

PSK31 (data) 31 Hz
CW = Morse code 100 Hz
RTTY = radioteletype 300 Hz
SSB = single side band 2 - 3 kHz
FM 10 - 20 kHz
Fastscan Television 6 MHz

How to study the frequency band chart

This chart lists some of the frequencies technician and technician with code licensees are allowed to use.

Don?t memorize it, just look it over. I?ve given all the frequencies in MHz; some of the test questions use kHz, so convert to MHz.

Notice the different bands.

A technician with code can operate with up to 200 watts PEP on the 4 HF bands 80, 40, 15, and 10 meters.

There are 3 VHF bands, 6, 2, and 1.25 meters, and a technician has full privileges on them.

Notice you can use 219-220 for digital message forwarding, this isn?t really a band.

Next we have the 4 UHF bands, .70, .33, .23, and .13 meters.

Use the wavelength/frequency formula Wavelength X Frequency = 300 to determine what band has a certain frequency.

For example, 28.400 MHz has wavelength of 10.56 meters, so it?s on the 10 meter band.

There is little frequency space for the longer wavelengths, for 80 meters and 40 meters it?s only .05 MHz, for 10 meters it?s .4 MHz. Because there is so little space on the HF bands, you?re only allowed to use modes that use little bandwidth.

CW uses little bandwidth and is allowed on every band. The second half of the 10 meter band (28.3 to 28.5) allows SSB phone.

The frequency space for the VHF bands is more than the HF bands, 4 MHz for 6 and 2 meters, 3 MHz for 1.25 meters.

For all bands 1.25 meters and shorter, all modes are allowed for technicians.

The UHF bands are even wider than the VHF bands, 30 MHz for 70 centimeters, 26 MHz for 33 centimeters, 60 MHz for 23 centimeters, and 70 MHz for 13 centimeters. North of line A you can?t use 420 MHz to 430 MHz. This is because in Canada, these frequencies are allocated for another service, and we don?t want any interference.

A band plan is a voluntary guideline for using different operating modes within an amateur band.

IV. Propagation

Line-of-sight propagation: When a signal travels in a straight line from one antenna to another.

Ground-wave propagation: When a signal travels along the surface of the Earth (following the earth?s curvature).

Sky-wave propagation: When a signal is returned to Earth (bent) by the ionosphere (usually an HF
signal).

Multi-hop propagation: When a signal bounces several times between the Earth and the ionosphere.

Sporadic-E propagation: Occurs in the 6 meter band in summertime, not in the higher frequencies.

Tropospheric ducting: A widespread temperature inversion can cause
VHF radio waves to travel many miles over oceans through the troposphere. Path loss through the troposphere increases as frequency increases.

Maximum usable frequency: In relation to sky-waves, the highest frequency signal that will reach its intended destination.

UHF is almost always above the maximum usable frequency.

VHF and UHF can be reflected by metal-framed buildings.

V. Ionosphere

Ultraviolet solar radiation causes ionization in the outer atmosphere, forming the ionosphere. Ionization is at a minimum just before sunrise. Sunspots

increase ionization. Sunspot cycles are 11 years.

The ionosphere is has several regions.

The D region is closest to the Earth; it absorbs MF/HF radio signals during the daytime.

In the F2 region, radio waves are bent back to earth (sky-waves), making DX radio communications possible.

Sky-waves have much longer range than ground waves, making HF well suited for DX contacts.

Local amateur communications should use VHF and UHF instead of HF, to minimize interference on HF bands capable of DX.

Signals that take off vertically from the antenna and are higher in frequency than the critical frequency pass through the ionosphere, which is why many amateur satellites operate on the VHF/UHF bands.

60. W8BBS Study Guide Part 4: Equipment

Yahoo group: NOFARSHamAcademy
Date: 2003-12-21 02:29:37 UTC
From: Billy Williams
Topic: 60 Message: 60

AMATEUR RADIO EQUIPMENT

I. Transceivers

Hand-held transceivers are portable devices, transceivers installed in cars are mobile devices, fixed devices are in homes.

The two most common bands used by "dual band" hand-held transceivers are 2 meters and 70 cm (VHF and UHF).

A power amplifier could boost the low-power output from your hand-held radio up to 100 watts.

If you are told your FM hand-held or mobile transceiver is over deviating you should talk farther away from the microphone.

Over deviation in an FM transmitter can cause out-of-channel emissions.

If your mobile transceiver does not power up, check the 12-volt fuses. To operate a mobile transceiver in your home, you could use a 12-volt car battery or a power supply. A power supply converts 120 V AC (house current) to 12 V DC. If you think the supply voltage to your 12-volt transceiver may be low when you transmit, you could connect a voltmeter at the 12-volt plug on the chassis of the equipment. If your mobile transceiver works in your car but not in your home, check the power supply.

It?s important to provide adequate DC source supply filtering for a mobile transceiver to reduce stray noise and RF pick-up.

For a CW transmitter, power supply filtering eliminates modulation of the RF signal by AC hum.

A bad filter capacitor in the transmitter's power supply may cause a buzzing or hum in the signal of an HF transmitter.

You would connect a microphone to a transceiver for voice operation, a telegraph key to send Morse code.

Many amateurs use an electronic keyer to help form good Morse code characters.

For RTTY operation, you would connect a modem and a teleprinter or computer system to a transceiver. In a packet-radio link "connected" means a transmitting station is sending data to only one receiving station; it replies that the data is being received correctly.

A transceiver designed for FM phone operation can also be used for SSB in the weak-signal portion of the 2-meter band if it?s a "multi-mode" radio. A multi-mode VHF transceiver is good for weak-signal VHF communications.

An S meter is used to measure relative signal strength in a receiver.

A squelch causes a receiver to reject signals below a certain strength. For proper operation, the squelch of an FM receiver should be set at the point that just silences background noise. If you set your receiver's signal squelch too low while attempting to receive packet mode transmissions, noise may cause the TNC to falsely detect a data carrier.

One accurate way to check the calibration of your receiver's tuning dial is to tune to WWV or WWVH.

Figure T8-6: Label this figure ?FM receiver?. The mixer in this superheterodyne receiver shifts the frequency of the received signal so that it can be processed by IF (intermediate frequency) stages. Because some emission types need more bandwidth than others to be received properly, many radio receivers have several IF filters of different bandwidths that can be selected by the operator.
Label block 1 ?frequency discriminator?. Write ?no frequency discriminator, no audio?.

Figure T8-5: Label this figure ?SSB / CW receiver?. Label block 1 ?product detector?. All receivers have a detector (to detect the information signal in the RF carrier). The product detector circuit combines signals from an IF amplifier stage and a beat-frequency oscillator (BFO) to produce an audio signal.

Figure T8-1: Label this figure ?VFO-controlled transmitter?. Label block 1 ?variable-frequency oscillator (VFO)?.
The purpose of the VFO is to control the frequency. Label block 1 ?control frequency?.

Figure T8-2: Label this figure ?FM transmitter?. Label block 1 ?reactance modulator?. Write ?no audio amplifier =
unmodulated carrier?.

Figure T8-7: Label the figure ?single conversion superheterodyne FM receiver?. Write ?can receive 157.7 + 10.7, 157.7 - 10.7? (147.0 MHz and 168.4 MHz).

II. Antennas

"Rubber duck" antennas for hand-held transceivers are too short to work well. They are much less efficient than a quarter-wavelength telescopic antenna.

An external antenna on the roof will improve the operation of a hand-held radio inside a vehicle.

With a multiband antenna you can operate on several bands with a single feed line.

A duplexer is used to connect a dual-band antenna to a mobile transceiver that has separate VHF and UHF output connectors.

Some antennas radiate more in some directions than others, which is to say they have gain.

For example, if the ends of a half-wavelength dipole antenna (mounted at least a half-wavelength high) point east and west, the antenna will send out radio energy mostly north and south.

Increasing antenna gain by 3 dB will double your signal's effective radiated power in the direction of maximum radiation.

A cubical quad antenna has two or more parallel four-sided wire loops, each approximately one electrical wavelength long.

Figure T8-8: Label the diagram ?Yagi antenna?, element 1 ?reflector?, element 2 ?driven?, element 3 ?director?.

The feed point, where the feed line joins the antenna, is the driven element. The driven element is about 1/2 wavelength long.

A Yagi antenna has one driven element and several other elements on a boom. Boom length has the greatest effect on the gain of a Yagi antenna.

EME (moonbounce, Earth-Moon-Earth) stations need a very high gain antenna, such as a parabolic-dish antenna, a multi-element array of collinear antennas, or a high-gain array of Yagi antennas.

A ground-plane antenna is not high gain, so it would NOT be a good choice for an EME station.

A vertical antenna is vertically polarized. A horizontal antenna is horizontally polarized.

The electric lines of force of a radio wave are in the same direction as the antenna that transmitted it. A satellite antenna is spinning, so its polarization is always changing. We call this circular polarization. Most VHF and UHF repeater antennas are vertically polarized, whereas horizontal polarization is used for weak signal VHF/UHF SSB operation.

Important considerations when selecting a location for a transmitting antenna are nearby structures, height above average terrain, and distance from the transmitter.

If you plan to erect an antenna higher than 200 feet you must notify the Federal Aviation Administration (FAA) and the FCC.

III. SWR meters

Standing-wave ratio is the ratio of maximum to minimum voltages on a feed line, measured with an SWR meter.

An SWR of 1:1 means the impedance of the antenna and its transmission line are matched perfectly.

An SWR reading of 4:1 indicates an impedance mismatch; something may be wrong with the antenna system.

Figure T8-3: Label block 1 ?transceiver?. Label block 2 ?antenna switch?. Label block 3 ?dummy antenna?.

The antenna switch switches between the antenna and the dummy antenna.
A dummy antenna for a 100-watt, single-sideband transmitter should have a rating of 100 watts continuous.

You might connect an SWR meter between your transceiver and an antenna switch connected to several antennas.

Figure T8-4: Label block 1 ?transceiver?. Label block 2 ?SWR meter?. Label block 3 ?antenna tuner?.

An antenna tuner might allow use of an antenna on a band it was not designed for.

An antenna tuner matches a transceiver output impedance to the antenna system impedance.

IV. Feed lines

The two common types of feed lines are coaxial cable and parallel-conductor.

Coaxial cable is a center wire inside an insulating material covered by a metal sleeve or shield.

You should use only good quality coaxial cable and connectors for a UHF antenna system to keep RF losses low.

Radio energy that is sent through a poor quality coaxial cable is converted to heat in the cable.

Parallel-conductor feed line is two wires side-by-side held apart by insulating material.

Parallel-conductor, open-wire feed line will operate well even with a high SWR and has less loss than coaxial cable.

"Balun" means balanced to unbalanced. You would install a balun between the coaxial cable and the antenna to feed a dipole antenna with 50-ohm coaxial cable. An unbalanced line is a feed line with one conductor connected to ground.

V. RF wattmeters

Peak envelope power (PEP) is the average power supplied to an antenna transmission line during one RF cycle at the crest of the modulation envelope. With regard to a transmitter and antenna system, "forward power" means the power traveling from the transmitter to the antenna.

"Reflected power" means the power returned towards the source on a transmission line. If a directional RF wattmeter reads 90 watts forward power and 10 watts reflected power, the actual transmitter output power is 80 watts. Of the 90 watts forward, 10 watts were reflected back, leaving 80 watts. Most RF watt meters operate at 50 ohm line impedance.

VI. Calculating antenna length

Antennas are often half-wavelength or quarter-wavelength.

To find the length of an antenna, you need to find the wavelength using the formula wavelength X frequency = 300.

To make a half-wavelength dipole antenna resonant at 147 MHz, we use wavelength = 300 / 147 MHz = 2.04 meters.

This means a half-wavelength = 1.02 meters. A meter is about 40 inches, so the length is about 40 inches.

The correct answer is 37 inches, close enough! (This method isn?t exact).

You could add a loading coil to reduce the physical length of an antenna without changing its resonant frequency.

VII. Harmonics and filters

A high-pass filter will allow RF above a certain frequency to pass, the RF below that frequency will be filtered out.

A low pass filter will allow RF below a certain value to pass.

A band-pass filter will allow RF within a certain frequency range to pass.

Sometimes, while transmitting at some frequency, a ?harmonic? signal will also be transmitted.

The frequency of the harmonic is exactly 2, 3, or more times than the transmitted frequency.

For example, the fourth harmonic of a 50.25 MHz signal is 201.00 MHz.

A low-pass filter connected to an amateur HF transmitter can cut down on harmonic radiation.

61. W8BBS Study Guide Part 5 : Operating Practices

Yahoo group: NOFARSHamAcademy
Date: 2003-12-30 17:23:54 UTC
From: Billy F. Williams Jr
Topic: 61 Message: 61

Operating Practices

I. Call Signs

The US is part of the ITU, International Telecommunications Union.

There are 3 ITU regions. The US is in region 2, including Alaska. Guam is in region 3.

The FCC issues new amateur radio call signs by ITU prefix letter(s), call sign district numeral and a suffix in strict alphabetic order.

Under the vanity call sign program you can get a call sign made up of your initials. My vanity call sign is W8BBS.

The first letter in US amateur call signs is always A, K, N or W.

The numbers used in US amateur call signs are a single digit, 0 through 9. My call sign district is 8, and BBS are my initials.

Group C and D station call sign format groups are available to Technician Class amateur radio operators (group A and B call sign format groups are reserved for Generals and Amateur Extras).

An amateur radio licensee can change his call sign without applying for a vanity call by requesting a systematic call sign change on an NCVEC Form 605.

An amateur radio club can get a station call sign by applying through a Club Station Call Sign Administrator.

Any licensed amateur is eligible to apply for temporary use of a 1-by-1 format Special Event call sign.

II. Station identification

An amateur station must identify itself (by call sign) at least every ten minutes and at the end of a contact.

When two amateur stations end communications each station must transmit its own call sign.

You must always use English to identify your station (or CW).

CW may always be used for station identification, regardless of the frequency.

Unidentified communications or signals are amateur communications that do NOT have the required station identification.

You should use the ITU phonetic alphabet when identifying your station because the words are internationally recognized substitutes for letters; "cute" phrases or word combinations are not easily understood by non-English-speaking amateurs.

III. Control Operator, Control Point

The control operator of an amateur station is any licensed amateur operator who is responsible for the station's transmissions.

An amateur licensee may operate any amateur equipment and control any number of transmitters at the same time.

A control operator of another amateur's station has the operating privileges of his own license, regardless of the license privileges of the station's owner.

A station licensee is responsible for its the proper operation, however, if you transmit from another amateur's station, both of you are responsible for its proper operation.

To keep unauthorized persons from using your amateur station at home, use a key-operated on/off switch in the main power line. The keep them off a mobile amateur station in your car, disconnect the microphone when you are not using it.

The control point of an amateur station is the location at which the control operator function is performed, where the control operator has full control over the transmitter.

An automatically controlled station does not require the control operator to be present at the control point. All other stations must have a control operator at the station's control point when transmitting.

IV. Third-party messages

The FCC assumes that you authorize ALL transmissions made with your call sign as the control operator.

You may let an unlicensed third party use your amateur station; however you must continuously monitor and supervise the third-party's participation.

Unlicensed family members can't transmit when they're alone because control operators must be licensed amateurs.

Third-party communications means "messages sent between two amateur stations for someone else". This usually means letting the third party take the microphone.

You may send third-party messages to a foreign country when the US has a third-party agreement with the foreign country (or the third party is qualified to be a control operator).

When sending third-party messages internationally, the US station must transmit both call signs at the end of each communication. No payment of any kind is allowed for third-party messages (it's amateur radio).

V.Repeaters

A repeater is a station that receives radio signals on one frequency, and simultaneously re-transmits then on another frequency (usually at higher power and through a good antenna).

The frequency difference is called the offset. Repeaters help mobile and low-power stations extend their usable range.

To use a repeater, you need to know its input frequency and offset. The usual offset for repeaters in the 2-meter band is 600 kHz (.6 MHz), for the 70-centimeter band it's 5.0 MHz.

A crossband repeater receives signals on one band and retransmits them on another band. If you set up a dual-band mobile transceiver to operate as a crossband repeater there must be a control operator at the system's control point.

To determine if a repeater is being used by other stations you could ask if the frequency is in use, then give your call sign.

If you transmit to test access to a repeater without giving any station identification, this is an illegal unidentified transmission.

To call another station on a repeater, say the station's call sign, then identify your own station.

To break into a conversation on a repeater say your call sign during a break between transmissions.

You should pause briefly between transmissions when using a repeater to listen for anyone wanting to break in.

When you finish talking and release the microphone button, you may hear a "courtesy tone" from the repeater, a sound used to indicate when a transmission is complete.

The courtesy tone resets the "time out timer" (a device that limits the amount of time a repeater can transmit continuously).

The repeater owner and donations from its users usually pays for the site rental and upkeep of most repeaters.

If you hear a closed repeater that you would like to use, you should contact the control operator and ask to join.

During commuting rush hours, third-party communications nets should be discouraged on repeaters.

You should keep transmissions short on a repeater so you don't prevent someone with an emergency from using the repeater.

Repeaters often identify themselves in Morse code.

"Simplex operation" means transmitting and receiving on the same frequency. To find out if simplex is possible, see if you can receive the station on the repeater's input frequency.

When possible, you should use simplex instead of tying up a repeater.

A continuous tone-coded squelch system (CTCSS) tone is a sub-audible tone, added to a carrier, which may cause a receiver to accept the signal.

If you are told that a "tone" is required to access a repeater, it means you must use a subaudible tone-coded squelch with your signal to cause the repeater to accept your signal.

Repeaters sometimes have an autopatch, a device that allows radio users to access the public telephone system.

Communication through an autopatch is not private.

You may use an autopatch to seek emergency assistance, call for a tow truck, call home, but not to pick up business messages. (Amateur radio is not for business use).

Repeater frequency coordination is a system wherein a frequency coordinator recommends that you operate your repeater on a specific repeater frequency pair.

If a repeater is causing harmful interference to another repeater and a frequency coordinator has recommended the operation of both repeaters, then both repeater licensees are responsible for resolving the interference.

Frequency-modulated phone is the voice emission most used on VHF/UHF repeaters.

Slow-scan television may be transmitted on a 2-meter repeater providing the repeater control operator authorizes it.

VI. Other types of stations
A beacon is an amateur station called that transmits for the purpose of observation of propagation and reception.

Automatic control is allowed in some band segments, one-way transmissions are allowed, maximum output power is 100 watts.

An amateur space station (satellite) is an amateur station located more than 50 kilometers above the Earth's surface.

Any licensed amateur operator may be the control operator of an amateur space station.

The most distant point from the Earth in the satellite's orbit is called the "apogee", the closest point is called the "perigee".

The mathematical parameters that describe a satellite's orbit are its Keplerian elements.

An amateur typically has 4 to 6 minutes per pass to communicate with the International Space Station.

The Doppler effect causes the frequency of a signal from an amateur satellite to increase or decrease as it passes overhead.

A telecommand station transmits telecommands- one way transmissions that control functions of a device at a distance (such as a model craft).

Telecommand stations don't have to identify themselves, but must have a label with the station call sign and the station licensee's name and address.

Telecommand stations must have a wire line or radio control link, a posted copy of the station license, and it must be protected so that no unauthorized transmission can be made (All of these).

A gateway is an amateur radio station that is used to connect other amateur stations with the Internet.

VII. FCC Rules

Some general principles established by the FCC rules are:

In an emergency anything and everything is allowed

You must always try to minimize interference

Amateur radio is AMATEUR, it's not for business use or to make money

An amateur operator must have a US mailing address so the licensee can receive mail from the FCC, otherwise your amateur license could be revoked.

You may transmit from a location different from the address on your license whenever you want.

If your mailing address changes, write (don't call!) the FCC in Gettysburg, PA (remember Gettysburg - address, write- don't call).

You may operate your amateur station aboard a cruise ship only with the approval of the master of the ship and not using the ship's radio equipment.

Aboard an aircraft you need the approval of the pilot.

Amateur stations are allowed to communicate with stations operating in other radio services only when authorized by the FCC or in an emergency.

An amateur may operate in a country other than his home country if there is a reciprocal operating agreement with both countries. There is no distance limit restricting amateur transmissions. You're allowed to communicate with an amateur in a foreign country at any time, unless it is not allowed by either government.

Broadcasting means transmissions intended for the general public. Amateur stations may not broadcast.

Amateurs may not transmit music, (except as part of an authorized rebroadcast of space shuttle communications).

Codes and ciphers may not be used to obscure the meaning of a message, (there are exceptions).

If an amateur pretends there is an emergency and transmits the word "MAYDAY," this is called false or deceptive signals.

An amateur station may never transmit false or deceptive signals.

An amateur station may transmit unidentified communications only when sent from a space station or to control a model craft.

Amateurs can't use indecent and obscene language because it is offensive, young children may hear it, and such language is prohibited by FCC Rules (ALL of these reasons).

Harmful interference is a transmission that disturbs other communications.

Transmitting on a police frequency as a "joke" is harmful interference. It deserves a large penalty because it interrupts police communications.

You may never deliberately interfere with another station's communications.

If an amateur repeatedly transmits on a frequency occupied by amateurs in a net, this is called harmful or malicious interference.

Amateur stations must always use the minimum legal power necessary to communicate.

Before you transmit on any frequency you should listen to make sure others are not using the frequency.

If someone tells you that signals from your hand-held transceiver are interfering with other signals on a frequency near yours, your hand-held may be transmitting spurious emissions.

If an SSB transmitter is operated with the microphone gain set too high it may cause splatter interference to other stations operating near its frequency.

If the FCC rules say that the amateur service is a secondary user of a frequency band, and another service is a primary user, this means amateurs are allowed to use the band only if they do not cause harmful interference to primary users

If a primary user causes you interference, you should change frequency; you could be causing him harmful interference.

If you learn that you are interfering with a radiolocation station outside the US, you must stop operating or take steps to eliminate this harmful interference.

If two amateur stations want to use the
same frequency both station operators have an equal right to operate on the frequency (regardless of license class).

VIII.Procedural signals, Q signals, and Signal Reports

The procedural signal "CQ" means calling any station.

The correct way to call CQ using voice is to say "CQ" three times, "this is," followed by your call sign spoken three times.

To answer a voice CQ, say the other station's call sign once, followed by "this is", then your call sign given phonetically.

When using Morse code,

"DE" means "From" or "this is," as in "KC8UPE DE W8BBS".

"K" means "any station transmit" (i.e. talk).

To call CQ send the letters "CQ" three times, followed by "DE," followed by your call sign sent three times.

To answer a CQ call, send the other station's call sign twice, followed by "DE," followed by your call sign twice.

A Morse code CQ call should be transmitted at a speed at which you can reliably receive.

"QRS" means "Send more slowly".

A "QSO" is a conversation.

"73" means best regards.

A "QSL" card is a written acknowledgment of communications between two amateurs (a postcard).

In a signal report, RST means Readability, Signal strength, Tone. "Your signal report is five nine plus 20 dB..." means a

relative signal-strength meter reading is 20 decibels greater than strength 9. "Your signal is full quieting..." means your signal is strong enough to overcome all receiver noise, it's a good signal.

IX. Emergencies

You may use your amateur station to transmit an "SOS" or "MAYDAY" only in a life- or property-threatening emergency.

If you are in contact with another station and you hear an emergency call for help on your frequency, you should stop your QSO immediately and take the emergency call.

If you hear a voice distress signal on a frequency outside of your license privileges, you are allowed to help on a frequency outside your privileges in any way possible.

If a disaster disrupts normal communication systems amateur stations may make transmissions that are necessary to meet essential communication needs and facilitate relief actions.

An FCC declaration of a temporary state of communication emergency will include any special conditions and special rules to be observed.

Tactical call signs such as "command post" or "weather center" are used during an emergency because they are more efficient and help coordinate public-service communications.

Messages sent into or out of a disaster area concerning a person's well being are called health and welfare traffic, those concerning the immediate safety of human life are called emergency traffic.

If you are helping in an emergency and have checked into a net, do not transmit on the net frequency until asked to do so by the net operator (to minimize interference to the net).

It's a good idea to be able to operate your amateur station without using commercial AC power lines so you may provide communications in an emergency.

The most important accessory to have for a hand-held radio in an emergency is several sets of charged batteries.

A dipole antenna is good for setting up in an emergency.

You must register with the responsible civil defense organization before you can participate in RACES drills.

You must identify messages sent during a RACES drill as drill or test messages.

X. Television interference

If you are told that your amateur station is causing television interference, you should first make sure that your station is

operating properly, and that it does not cause interference to your own television.

If you cause interference to nearby radio or television broadcast receivers, the FCC rules can require that you discontinue operation on frequencies causing interference during certain evening hours and on Sunday morning (local time- so people can watch church on TV?).

"Receiver overload" is interference caused by strong signals from a nearby source.

If signals from your transmitter are causing front-end overload in your neighbor's television receiver, the owner of the television receiver is responsible for resolving the interference.

A high-pass filter should be connected to a TV receiver as the first step in trying to prevent RF overload from an amateur HF station. TV sets receive VHF and UHF, which are higher frequencies than HF, so a high-pass filter would filter out the HF signal.

If harmonic radiation from your transmitter is causing interference to television receivers in your neighborhood, you alone are responsible for taking care of the interference, since your transmitter is causing the problem.

A break in a cable television transmission line can cause TV interference to result when the amateur station is transmitting, or cause interference to the amateur receiver.

The major cause of telephone interference is that the telephone was not equipped with interference protection when it was manufactured.

62. W8BBS Study Guide Part 6: Safety

Yahoo group: NOFARSHamAcademy
Date: 2003-12-30 17:36:15 UTC
From: Billy F. Williams Jr
Topic: 62 Message: 62

Safety

I. Tower Safety

Before climbing an antenna tower you should put on your safety belt and safety glasses.

An old leather climbing belt is probably brittle and could break unexpectedly.

When you're on the ground you should wear a hard hat to protect your head from something dropped from the tower.

The MOST important safety precaution to take is to stay well clear of any power lines.

You should take all reasonable safety precautions. The answer to most of the safety questions is "All of these".

II. Electric Shock / Lightning

As little as 30 volts is usually dangerous to humans.

The heart can be fatally affected by a very small amount of electrical current, as little as 1/10 of an ampere will probably be fatal.

To protect from lightning damage, ground all antennas when they are not in use, and disconnect all station equipment from the power lines and antenna cables.

To protect against electric shock, connect all station equipment to a common ground.

The green wire in a three-wire electrical plug represents ground (think Green = Ground).

Everyone should know the location of the main power switch in case of an emergency.

The power supply should be controlled by a safety interlock switch in an amateur transceiver or power amplifier.

III. Radiation Safety

Radio frequency radiation is non-Ionizing radiation (as opposed to X-radiation, gamma radiation, and ultra violet radiation).

Heating of body tissues is one effect of RF non-ionizing radiation on the human body. This can cause cataracts in the eyes.

Amateur Radio operators are required to meet the FCC RF radiation exposure limits to ensure a safe operating environment for amateurs, their families and neighbors.

The FCC RF radiation maximum permissible exposure (MPE) limits are defined in FCC Part 1 and Office of Engineering and Technology (OET) Bulletin 65.

Look at figure T0-1. This chart is taken from the Office of Engineering and Technology (OET) Bulletin 65.

This chart gives maximum exposure (MPE) limits for different frequencies for "controlled" environments (places you occupy, your home and yard) and "uncontrolled" environments (places where you have no control, where the general public might be).

Notice that exposure limits vary with frequency.

This is because the human body absorbs RF energy more at some frequencies than at others.

The concept of "specific absorption rate (SAR)" is one factor used to determine safe RF radiation exposure levels because it takes into account the rate at which the human body absorbs RF energy at a particular frequency (remember, rate).

The maximum permissible exposure (MPE) limits are based on the whole-body specific absorption rate (SAR).

These limits are not maximum power densities that may be emitted; FCC Rules specify exposure limits, not emission limits.

These limits are the maximum AVERAGE power densities that are safe.

The concept of "duty cycle" takes into account the amount of time the transmitter is operating at full power during a transmission.
If a station has a low duty cycle, its average power density will be low, even if it transmits at high power.

Notice that the exposure limits are more stringent for an "uncontrolled" environment than for a "uncontrolled" environment.

Notice that for controlled areas, power densities are averaged for 6 minutes, for uncontrolled areas it's 30 minutes.

To comply with RF-radiation exposure guidelines for "controlled" environments, you could reduce transmitting times within a 6-minute period to reduce the duty cycle (30 minutes for "uncontrolled" environments).

Figure T0-1: Find the equation for maximum permissible exposure for a controlled environment for the HF bands.

To do this, use the top half of the figure, and note that HF is "3.0 - 30" MHz. The answer is "900/f squared" (circle it).
Circle the lowest and highest frequencies covered by FCC's RF radiation exposure guidelines (.3 MHz and 100,000 MHz).

Don't forget that 100,000 MHz = 100 giga Hz, or 100 GHz, and .3 MHz = 300 kHz.

Circle the frequency range where the RF radiation exposure limits are most stringent (30 MHz to 300 MHz, VHF). Circle the units of measure for power density (milliwatts per square centimeter, or mW/cm2). Circle the units of measure for RF electric field strength (volts per meter, or V/m).

Circle the averaging time for a controlled environment (6 minutes) and for an uncontrolled environment (30 minutes).

Figure T0-2: This figure actually has 5 different charts, the result of computer modeling.

For different power levels, these charts give "controlled" and "uncontrolled" minimum safe distance limits.

The power density limits on the charts were determined from figure T0-1.

The limits are different on the 5 charts because each chart is for a different frequency and different type of antenna.

Antenna gain is part of the formulas used to perform calculations, and ground interactions must be taken into account when using a computer program to model RF fields at your station.

To answer the "minimum safe distance" questions, find the chart for the antenna type in the question.

Look in the "Transmitter power" column for the power level given in the question.

See if the question is asking for the "controlled" or "uncontrolled" limit.

RF exposure is effected by: frequency and power of the RF field, antenna height, distance, and radiation pattern (All of these).

Lower duty cycles subject people in the environment to lower RF radiation, so the lower the duty cycle, the shorter the compliance distance (compliance distance is increased with an increase in the duty cycle).

To comply with RF-radiation exposure guidelines for "controlled" environments, you could reduce transmitting times within a 6-minute period to reduce the station duty cycle (30 minutes for "uncontrolled" environments).

For the same PEP (power), single-sideband (SSB) results in less RF radiation exposure than phase-modulated FM, or CW.

Use the minimum power needed with a hand-held radio to reduce the level of RF radiation exposure to your head.

IV. Routine station evaluation

VHF stations operating above 50 watts PEP are required to perform a routine RF radiation evaluation.

Three ways an amateur can determine that his station complies with FCC RF-exposure regulations are:

by calculation, based on FCC OET Bulletin No. 65

by calculation, based on computer modeling

by measurement, using a calibrated field strength meter with a calibrated field strength sensor, no calculations needed.

There are no mandatory procedures for evaluating compliance.

Records of a routine RF radiation exposure evaluation are not required, (but may prove useful).

An antenna close to the ground will usually create a stronger RF field on the ground beneath it than a higher antenna.

In the far field, as the distance from the source increases, power density is proportional to the inverse square of the distance.

In the near field it is difficult to accurately evaluate the effects of RF exposure, it depends on the type of antenna being used.

Wavelength and the physical size of the antenna determine the boundary between the near and far fields of an antenna.

V. More radiation safety

To avoid excessive human exposure to RF fields, antennas should be mounted as far away from accessible areas as possible.

To prevent exposure to RF radiation in excess of FCC limits, an amateur can alter antenna patterns, relocate antennas, revise station technical parameters, such as frequency, power, or emission type (All of these).

If your repeater station antenna will be located at a site that is occupied by antennas for transmitters in other services, your radiated signal must be considered as part of the total RF radiation from the site when determining RF radiation exposure levels.

The FCC considers a hand-held transceiver to be a portable device when evaluating for RF radiation exposure because its transmitting

antenna is usually within 20 centimeters of the human body.

Use the minimum power needed with a hand-held radio to reduce the level of RF radiation exposure to your head.

A mobile transceiver might produce less RF radiation exposure than a hand-held because mobile antennas mounted on a metal vehicle roof are generally well shielded from vehicle occupants.

Don't look into the open end of a microwave feed horn antenna while it's transmitting because you could expose your eyes to excessive RF radiation.

If you touch an antenna while it's transmitting high power, you could be injured by RF burns.

64. New Ham Advisor Web Page

Yahoo group: NOFARSHamAcademy
Date: 2005-09-15 14:45:47 UTC
From: Billy F. Williams Jr
Topic: 64 Message: 64

A recent addition to the North Florida Amateur Radio Society web page is the New Ham Advisor. It can be accessed from the http://www.nofars.org main page by clicking on the link or it can be accessed directly via http://www.nofars.org/newham.html

The New Ham Advisor page is edited by NOFARS member Mike Davis, N4FOZ. Mike can be contacted via e-mail or telephone for advice. He also is interested in suggestions for additional topics for the page.